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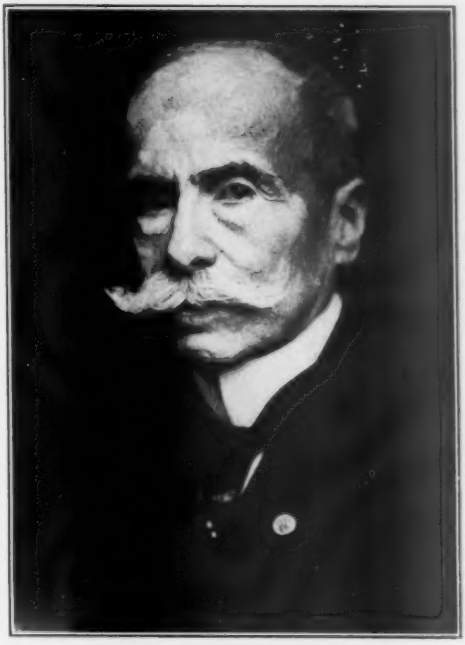
VOL. II

SAFETY—EFFICIENCY—CONSERVATION

No. 1

JANUARY, 1916.



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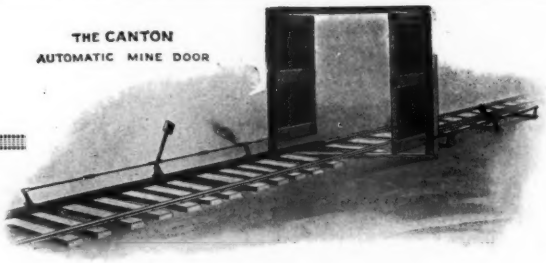

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JANUARY 1916

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Second—Intelligent conservation with a view to the highest development and use of our mineral resources.

Third—The stimulation of investment in practical mining operations by showing that mining is a legitimate business when intelligently conducted.

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THE MINING CONGRESS JOURNAL

Official Organ of the American Mining Congress

MINERS OF WESTERN HEMISPHERE EXCHANGE VIEWS AT PAN-AMERICAN CONFERENCE

Neglect on Part of United States to Develop Nitrogen Supply Leaves it Almost Helpless to Defend Itself Adequately, Noted Scientists Agree— Dr. Raymond's Work Commended

Ranking with the most important scientific gatherings ever held is the Pan-American Scientific Conference, which began its sessions in Washington December 27. Section 7 of the conference, dealing with mining, metallurgy, economic geology and applied chemistry, and Section 3, covering various features of conservation, are of direct interest to the mining industry. The conference was attended by a large number of the leading men in the mining industry, not only in the United States, but in each of the republics of Latin America.

The section was divided into sub-sections, of which Van H. Manning was chairman of that pertaining to mining; W. R. Ingalls, metallurgy; George Otis Smith, economic geology, and Charles E. Munroe, applied chemistry.

JENNINGS COMMENDED

To Hennen Jennings, chairman of Section 7, is attributed much of the credit for its successful conduct. Mr. Jennings was indefatigable in his efforts to make the meeting one of real profit to the industry, not only in the United States, but in all of the American republics. That he has succeeded is attested by the testimony of many of the most prominent men known to mining.

With reference to the conference, Mr. Jennings said:

"It has been a great event. The discussion of so many matters of vital interest to the industries, covered by Section 7, has imparted instruction that would have taken years to become available through ordinary channels.

"I consider that one of the most important events of the meeting was the privilege of hearing and communing with Dr. Raymond, the secretary emeritus of the American Institute of Mining Engineers. For forty-five years he has been the inspiration of the institute. In its early struggles he brought its transactions to such a high plane that it has tied together the mining men of the world in a society recognized to the corners of the earth.

"Dr. Raymond not only has aided the members of the society as far as the grave, but has done much in their memory, as he has written the biography of the members of the institute who have died."

On the opening day of the conference Section 7 met as a whole. On subsequent days each sub-section had its own meetings.

Mr. Jennings, in his opening address, said:

"I desire to be brief and give you speedy opportunity to hear those who have greater gift of expression than myself, and who, no doubt, you desire to hear as soon as possible. But, as chairman of this great section of mining, metallurgy, economic geology and applied chemistry, I must at least raise my voice to the full, though it be but feeble, to proclaim how great, how mighty, how all-comprehensive is my theme, and how, in fact, the whole fabric of modern civilization rests on its shoulders.

"Mining and agriculture are the only basic productive pursuits of man, and they are both fostered each by the other, and both dependent on Mother Earth. The one skims her surface; the other goes deeper. Agriculture furnishes man with food for existence, but mining gives him the materials for power, art, and civilization. Without metals, the scientists' tools for experimentation and determi-

nation would not be possible, nor the great diffusion of knowledge and thought by means of the printing press, photographic appliances, telegraph, cable, and the telephone.

A CONTRAST

"In contrast to the bewildering might of the battleship's guns, with their 1,400-pound weight and 2,600 feet per second velocity arguments, the metals have given man fingers so delicate, untiring, and accurate that they can work and control threads so fine that fleecy muslins and laces grow in abundance under their touch.

"Mining and metallurgy must go hand in hand, for each would be impossible or impotent without the other. Economic geology and applied chemistry are the necessary lights, guides, and inspirations to advance the power and usefulness of the miner and metallurgist.

"Agriculture and mining went hand in hand in modest moderation until a brief yesterday of fifty years, when, lo and behold! the scientist, inventor and engineer perceived that through the mineral kingdom they could generate and control forces as great and wonderful and obedient as the genii of Aladdin's lamp. With the steam engine, the turbine and dynamo, there was placed in man's hands the fundamental implements of manufacture and the flexible distribution of force. The main restraining bonds that confine and make effective the steam are iron and metal; those of the turbine and dynamo, iron, steel, copper and aluminum; while coal, petroleum, gas and water are the mighty driving forces. And gold must not be forgotten. It made all possible through its stored cells of human energy that radiated genial currents of trade confidence which inspired and gave courage to gigantic undertakings.

"In the manufacture of force the miner, scientist, engineer and mechanic all had to do team work and each aid the other, the miner giving to all others the necessary materials. In return, knowledge and skill were given mining projects that multiplied and expanded their outputs. And so the forces have traveled in cycles—the miner giving to the engineer, the engineer giving to the miner, and in such wonderful and startling way that the gold, coal, iron, copper and petroleum demanded in the manufacture of force and other needs of modern civilization have so progressively increased within the last half century that the past fifteen years' output of of these fundamental force producers and force restrainers have probably, with the exception of gold, more than equaled the total output of all previous time in the history of the world. With these outputs bank deposits, railroad construction, war armaments, steam vessels and other forms of wealth and power have sympathetically advanced.

A COMPARISON

Contemplate, then calculate, what is the force that has been unlocked by the mining of 535,000,000 tons of coal and 222,000,000 barrels of petroleum produced in 1912 in the United States. This force, if all used for steam and expressed even in the imperfect efficiency of the steam engine, would still show, in terms of man's muscular capacity, an equivalent of the work of 2,700,000,000 strong men working continuously for ten hours a day throughout the entire year.

"Falling water has also been harnessed and made use of by the copper band windings of the dynamo, and generates still other great forces. The chemist's great might, expressed through explosives, has also been given man within comparatively few years, and is being progressively increased. Thus, in so short a time, has the miner, metallurgist, scientist and engineer unlocked and tapped great force-fountains that the world has not had time to digest properly its uses or control the haste, greed and waste that has been brought in its train. And, although these forces have made possible the construction of the Panama Canal or the San Francisco Exposition, they are correspondingly responsible for the European war. But here I fear I am drifting away from my theme and getting on dangerous ground. It will be wise for me to call on the shepherd of our fold to extricate me from my difficulties.

INTRODUCES MR. LANE

"The Interior Department has the guardianship of the mining and metallurgical industries of this country. Its great Bureau of Geological Survey has been for long an aid and guide to the miner. Comparatively recently the Bureau of Mines has been established, which further aids both miner and metallurgist, and it is believed and hoped that under the present Secretary, who has ever shown rare interest and given intelligent support to the needs of the mining world, further progress will be made in output, safety and conservation. The mining world believes in him, and it is my privilege and pleasure to introduce to this meeting the Secretary of the Interior."

SECRETARY LANE SPEAKS

Secretary Lane spoke interestingly of the Government's intense desire to do all in its power to put mining on a basis that it will contribute in increasing volume to the greatness of the United States. He referred to the present European war, with the remark that, although life is a battle, it should be a battle between man and nature, not between man and man. One of the most important discoveries in this struggle is that man has found in nature herself the means of combating the evils that she sometimes uses as weapons against man. The most remarkable instance of this discovery is afforded by the work of Pasteur, which ranks amongst those that have been most beneficial to the welfare and progress of man.

MR. PEZET SPEAKS

In a happily worded address, the Peruvian Minister, Federico A. Pezet, outlined the mineral resources of Peru. Incidentally, his auditors were surprised at his fluent English.

He apologized for not being sufficiently technical, adding that mining and geology were two of the very few subjects with which a diplomat is not thoroughly familiar. He gave a brief description of the climatic and other conditions of his country and of its mineral and agricultural resources, all of which, he said, are very great and promising, but which, unfortunately, have not been developed, owing to lack of sufficient capital. He gave a long list of these resources, in which he included guano, gold, silver, mercury, manganese and many minerals which he could not name because their names were, to him, unpronouncable. He added that the country itself furnished fuel and water power in abundance for the exploitation of these resources. He ended by saying that he was speaking in earnest, neither boasting nor boosting, although he perhaps might be able to do a little boosting on occasion, having learned the art among his American friends in California.

TALKS ON PERU

Dr. Isaac Alzomora, chairman of the Peruvian delegation, gave a very substantial talk, dealing also with the resources of Peru and the many opportunities it offered to American capital and enterprise. He called attention to the liberality of the Peruvian mining laws, stating that for twenty-five years all the mining industries had been exempted from taxation; and yet, he added, it was strange that so few capitalists had availed themselves of such privilege.

DR. RAYMOND'S ADDRESS

One of the features of the whole conference was the address of Dr. R. W. Raymond, secretary emeritus of the American Institute of Mining Engineers, which was delivered December 28. Mr. Jennings introduced him as one of the best beloved and most universally known of all mining men. He suggested that, as Mr. Raymond is one of the men who is contributing so profitably to the industry, all men connected with mining are delighted to honor him.

Instead of following the line of the paper which he had prepared, he said he would follow the example of one of Shakespeare's heroes, who, holding a threateningly lengthy document in his hand, relieved his audience by saying, "I have it here, but, begging your pardon, I shall not read it." Dr. Raymond gave a brief verbal resumé of his paper, in which he emphasized the value of technical societies as means of bringing together men engaged in the same pursuits, enabling them to interchange their knowledge and experience, giving professional ability an opportunity to become known and thereby receive recognition and disseminate information by means of appropriate publications. He ended with a hearty welcome to the Latin-American delegates, and expressed the hope that the much-desired union of the American republics in a great brotherhood of nations might be realized fully.

UNDERGROUND WATERS

W. L. Saunder, president American Institute of Mining Engineers, gave a verbal resumé of his paper, dealing with the application of compressed air to the air-lift for the raising of underground water. After this, the paper was submitted for discussion by the chairman, and several of the members asked questions which Mr. Saunder answered very fully, throwing a great deal of light on the subject and at the same time showing that he is a thorough master of it. He gave some curious details regarding the character of some underground currents. He told how several miles off the coast of Atlantic City fresh water can be obtained in large quantities by drilling through the bottom of the sea.

TELLS OF CHILE'S NITRATE

The most important subject discussed during the day was that of the nitrate industry. A very able paper on this subject was read by Enrique Cuevas, counsellor of the Chilean Embassy. He gave a brief history of the Chilean nitrate fields, and described at length their character and composition, as well as the methods of extracting and treating the material. He emphasized the fact that those deposits are practically inexhaustible, and that they probably will continue for several centuries to produce as much as they are doing today. The present output is valued at $75,000,000 annually. This, he remarked, refers only to that part that has been exploited; it is only about two-tenths of the whole available field.

He attributed the war between Peru and Chile, in which the former country lost two of its southern provinces, largely to archaic mining laws, which were the only statutes of that time. Many of his remarks as to the possibility of trouble growing out of inadequate mining laws were regarded as bearing a special lesson to the United States, where the industry is staggering along in misfit legal clothing.

Without question, the most spectacular discussion of the entire congress resulted from the comment by those present on this paper.

Dr. Thomas H. Norton, of the Department of Commerce, declared the nitrate matter to be the most important topic that could be brought before the attention of the Scientific Congress; for, he said, the nitrate industry is both a powerful element of construction and destruction. It is the main fertilizer through which nitrogen is made available for the production of valuable crops in soils that would otherwise be barren or of little value. In contrast, it is also the source from which the nitric acid used in the manufacture of explo-

sives and other war materials is extracted. In connection with the latter feature, he said that war today was not, as commonly believed, controlled by bankers and other business men, but almost exclusively by chemists. He referred to the fact that the nitrogen needed for nitric acid can be obtained not only from the nitrates of Chile, but also from the atmosphere, where it exists as part of the air. Germany has developed very highly the methods for making this source available, the result being that today she is in this respect self-supporting, and therefore able to produce the vast quantities of explosives of which she is so much in need in the present unfortunate circumstances. The United States, he added, imports all its nitrate from Chile, whereas it not only could manufacture it by the same process that is used in Germany, but also could obtain it in large quantities from sea weeds abundantly found in the Pacific, not far from the American coast. From this source alone about $90,000,000 worth of nitrate could be obtained every year, which is twice the amount paid for imported nitrate.

CONTROLLED BY CHEMISTS

Dr. A. S. Cushman, Director of the Institute of Industrial Research, spoke along lines very similar to those followed by Dr. Norton. Referring again to war conditions, he also declared that war is controlled by chemists rather than by capitalists, and made the statement that, according to information he had received from leading European scientists, the only thing that prevented war in Europe at the time of the Moroccan incident was the apparently simple fact that the chemists were not ready. Last year they were ready, and there was war. He deplored the sad fact that, although it was two Americans who first solved the problem of extracting nitrogen from the atmosphere for the production of nitric acid, very little has been done in the United States to turn their discovery to advantage. Capital refused to interest itself in their industry. They died of hunger, and today other countries owe their independence and self-support to that discovery, and can produce nitric acid almost indefinitely, whereas the United States has not enough of it to manufacture for more than a few weeks the war elements they would need in order to defend themselves against the aggression of a powerful nation. He concluded by saying that it was the duty of all those conversant with the situation to impress upon the people of the United States the necessity of making every possible effort, first, to keep in storage large quantities of Chilean nitrate, and, in addition, to put in operation on a large scale the methods of producing nitric acid from atmospheric nitrogen, which, he added, served not only the interest of industry in general, but the safety of the nation as well.

(Continued on page 36)

MANNING REVIEWS WORK OF YEAR BY BUREAU OF MINES

Millions of dollars, heretofore wasted, have been saved to the industries of the country by the United States Bureau of Mines, according to the annual report of Van H. Manning, director of that bureau. When the European war started and cut off supplies of raw products the bureau put its efforts to finding raw products in this country, and was successful.

The bureau called attention to the fact that $75,000,000 of coal-tar products were being wasted annually, while the industries were importing it from Germany. The bureau's work has resulted in the replacing of the beehive coke ovens, which wasted this product, with the new form of by-product ovens. Dr. W. F. Rittman's discovery of a process for the manufacture from petroleum of benzol and toluol, used in the manufacture of dyes and high explosives, is dealt with in the report. Dr. Rittman also devised a process which will enable refiners to increase the output of gasoline from crude petroleum 200 per cent or more.

The bureau has developed that the losses to the oil and natural gas industry in a year's time through careless and reckless exploitation amounts to $50,000,000, and has devised and demonstrated a practical process for drilling wells by which the waste of gas and the invasion of water may be stopped, thus saving in a single State natural gas worth more than $15,000,000.

Looking into the future, the bureau is investigating the vast deposits of the oil shales of Utah and Colorado, believing that the oil supply will come from them at no distant period. These shales, it is said, rival as sources of petroleum the oil shales of Scotland and New South Wales, which have been profitably exploited in spite of the continued competition of oil from other sources.

The studying of the combustion of coal by experts of the bureau has led to certain information that calls for new designs for furnaces which will prove more economical.

The experts of the bureau have been endeavoring to develop the use of what is known as the gas-producer, which burns a much lower grade of coal than the steam boiler and produces power, it is said, at less expense than other methods. They deplore the tendency in this country toward the almost exclusive use of high-grade coals and point to the ruthless waste and neglect of low-grade fuels, which is in sharp contrast to the situation in Europe. It is the expectation of these experts to see the railroads of the country operated by electricity, obtaining their power from gigantic gas-producer power plants located at the mines.

CHANCES FOR REVISION OF MINING LAWS ARE BELIEVED BETTER THAN EVER BEFORE

Great Stimulus Given Movement at Enthusiastic Meeting in Washington of Leading Mining Men—Mining Organizations Join in Effort to Free Industry of Archaic Statutes

Great stimulus was given the campaign for a revision of the mining laws of the United States by the meeting in Washington, December 16, of representative mining men from all parts of the country. The meeting was called by the Mining and Metallurgical Society of America in collaboration with the American Mining Congress, the American Institute of Mining Engineers, the Idaho Mining Association, the Montana Society of Engineers, the California Metal Producers' Association, the Spokane Mining Men's Club, the Nevada Mine Operators' Association, the Colorado Scientific Society, with representatives from several Chambers of Commerce and many operating mines.

W. R. Ingalls and F. F. Sharpless, president and secretary, respectively, of the Metallurgical Society, worked tirelessly to make the meeting a success. That it attracted important attention on the part of Congress is very evident. As a result hope is brighter for the initiation of steps looking to the revision of the mining laws.

MORNING SESSION

In opening the morning session, Mr. Ingalls explained briefly the object of the meeting. On motion Mr. Ingalls made the following appointments of committees:

Committee on Credentials—J. F. Callbreath, Secretary of the American Mining Congress; George Collins, Denver, and George C. Stone, New York.

Committee on Rules—J. P. Channing, New York; Seeley W. Mudd, Los Angeles, and Frank A. Ross, Spokane.

Committee on Resolutions—H. V. Winchell, Minneapolis; E. B. Kirby, St. Louis; Hennen Jennings, Washington; Walter Douglas, Bisbee, Arizona and John Kirchen, Tonopah, Nev.

Mr. Ingalls then called Carl Scholz, President of the American Mining Congress, to the chair. Mr. Scholz assured those present of the pleasure with which the American Mining Congress has cooperated in the meeting in an effort to hasten a revision of the mining laws. He called on E. B. Kirby, Chairman of the American Mining Congress Committee on Revision for a history of mining laws. The value of Mr. Kirby's paper was indicated throughout the session by the numerous times to which it was referred by the speakers. Extracts from Mr. Kirby's remarks are as follows:

Through all the confused records of mining customs and laws in the past, certain facts stand out clearly. First among these is the underlying conviction which seems to have been unanimous among all classes outside of the miners that those who worked or operated mines were created by a beneficient providence for the express purpose of being plundered. The main question always seems to have been: How much would the capital and labor engaged in mining stand without being killed off and who was to get most of the plunder?

A FIGHT FROM THE START

Hence mining customs and laws have been mainly the result not of steadily developing principles, but of incessant fighting. Mining codes therefore vary greatly, some having been beneficial and others disastrous to the industry. Mr. H. C. Hoover, in calling attention to some of these facts, points out that the contestants were usually four in number; the political head such as the king, prince or bishop, who desired mining wealth for his personal use; the State or community in general which wanted it for revenue, the land and the miner (which latter term of course, included both operators and workmen). All that saved the miner from extinction was the fact that without his skill no one could get anything. With relinquishment of the King's claims the contest has become triangular, while the State now bases its claims upon logic instead of power so that the main opponent of the operator at present is the land owner who still exacts his royalty of 12 to 30 per cent of the gross products.

Fighting over profits has naturally interfered with a proper consideration of what would be best for the welfare of the industry. The mining communities have always recognized more or less clearly what was necessary, but they have generally been under the power of others and have been forced again and again to submit to policies which have brought the industry to a standstill. Much of the bad legislation has been caused by the inability of well meaning, but non-mining men to understand the technical peculiarities of ore deposits and mining methods. It seems for instance to have been almost as hard to explain to Napoleon Bonaparte as to an average American lawyer, the reasons why ordinary land tenure is disastrous when applied to mineral land.

SOME GOOD RESULTS

Notwithstanding the confusion introduced by the desperate class struggles of the past, certain underlying facts have been made apparent.

(1) Mining is a very sensitive industry, easily destroyed, but wonderfully responsive to just and wise legislation.

(2) The laws best for the industry have been those evolved by the miners, whenever they have been free to work out their ideas.

(3) Ordinary land tenure kills the mining industry in most kinds of deposits and restricts it in all cases.

(4) It is not to the interest of the community to have ore deposits held undiscovered or unworked.

(5) The practical problem has always been the same; how to induce capital and labor to undertake the risks of mining; how to prevent the idle holding of deposits; how to prevent operators from tying up more ground than they need.

It is not necessary to touch here upon the long indictment against the American mining code for others are to address you upon that subject.

Now that it is at last to be revised it is of special interest to note how the greatest revision of history, that of 1783, was made. The procedure by which the work was accomplished was, for that government and that time, even more remarkable than the code itself. We are told that at the command of the King of Spain the miners throughout the Spanish dominions of America elected deputies who assembled in a cenvention and proceeded to frame the new ordinances. That the questions at issue were hard fought may be inferred from the fact that after many months the King found it necessary to force an agreement ordering the completion of the work within a certain time which made the total session about ten months.

The ordinances provided for a carefully planned system of administration required to make them effective and the King in adopting the code required the very men who had framed it to undertake the permanent administration of its operations. The new law was admirably adapted to the conditions of the time and has always commanded the respect and enthusiasm of mining men.

SECRETARY LANE SPEAKS

Mr. Scholz then introduced Secretary Lane, who spoke in part as follows:

"I ought to have some sympathy with mining men, mining engineers, prospectors, operators, because I lived all the early part of my life among them. I grew up in an atmosphere of speculation in mines and the development of new processes. The soil of California in its early day was not regarded as nearly as precious as it is today. Within my own life, I remember well the time when it was not dreamed that California could ever ship 40,000, 50,000 or 60,000 carloads of oranges a year, but now we pride ourselves upon being the great gold exporting center of the world. And as a boy I knew practically all of those men who did so much for the early development of our western country. I lived for a time in the house of a man whom perhaps most of you knew only by name, but he was in his day a very considerable man in our part of the country and an aid in our development—Mr. Ross Brown.

"All the men of the famous Comstock mine were familiar sights to me on my way to and from school, and I lived near the palaces which they built upon Knob Hill. I wondered if there was a possibility for me to have one of those palaces some day.

HONORS WILLIAMS

"As I look over the audience, my eye lights upon one man whom I am proud to honor. This last year a great distinction came to me, an event of which I am more proud than anything else. I received the degree of LL.D. from my home university, the University of California, which did so much for the development of our mineral resources, and there is in this audience the man who is the oldest survivor of the class of 1865. He then received that degree. He represents the earliest date and I am the latest date—Mr. Gardner F. Williams.

"I know why it is that you gentlemen are so drawn to this profession. It is not the mere making of the money, though that, of course, is not overlooked, but it represents that spirit of adventure which is the very strenuous spirit of America. I doubt if all the lure of the wealth that is to be made in Chile, California, China, or South Africa would have drawn out of you the enterprise and the imagination that you have shown. You are drawn on to this work because of your desire to discover something that man before has not known. The prospector is not the only adventurer in mining. The man who sinks the deep shaft, the man who drives the long tunnel, the man who makes the new machine, the man who develops the hydro-electric power to develop the mine, the man in the laboratory who works out the new processes; all of them are equal adventurers seeking the novel sensation of revealing something to the world, and I hope that the Department which I represent can help you in your quest.

"I want to see the Bureau of Mines erected into a great power not only to emphasize to the people of the United States the magnitude of the wealth and the resources that we have in our mines, but the possibility of making the United States strong and independent and self-sufficient.

WANTS ONLY TO AID

"We want in no way to hamper the development of this industry. We want to do everything to further it. Congress has allowed the establishment of experimental stations. It so far has allowed no money for that purpose. Their processes are somewhat slow but not at all hopeless. When we have these experimental stations we want to have them under the command of men of science who will be able to help you. I hope that in course of time we will develop for the mines of the West and the mines of the East an interest just as strong as the Government has shown for the farmers.

"One of the things that has concerned me somewhat has been the confusion in mining law. I belong to the legal profession. You are expert engineers. A more dangerous combination cannot be produced. If there is any combination on earth that can develop confusion and make it worse confounded, it is such a combination as that, and as an outgrowth of our enterprise we

1. The mining laws of the United States should be revised, not piecemeal, but thoroughly, so as to coordinate and harmonize its various provisions.

2. For the purpose of giving the fullest consideration to the needs of every branch of the mining industry and every section of the country as affected by the mineral land laws of the United States, it is desirable that a government commission be created by act of Congress, whose duty it shall be to investigate by every proper means the questions and interests here referred to, and to make recommendations as to a basis for the proposed mining law revision.

3. That in order to represent the classes of men whose interests will be affected, the proposed commission should consist of five members; one representing the legal profession, one representing the Department of the Interior, and three men actively interested and experienced in mining and the acquisition and handling of mineral lands.

4. That this commission shall be selected and appointed by the President of the United States.

5. That this conference believes that the services of such a commission are deserving of compensation, as well as reimbursement for all necessary expenses, but is more concerned with the actual establishment of the commission and its character than with the question of emolument; and will gladly see the work done through an honorary commission if Congress deems it advisable.

6. That this conference expresses itself in favor of the creation of a permanent committee on mining law revision, such committee to consist of five members from the Mining and Metallurgical Society of America, five from the American Institute of Mining Engineers, and five from the American Mining Congress, and be appointed by these organizations. Such committee to have the power to select its own chairman and secretary and to add to its membership not to exceed ten additional mining men or others interested in the subject for which the committee is created. The work of this committee shall be to further the interests of the mining industry through Congressional action in accordance with the resolutions adopted at this conference; and its joint report shall be presented to each of the societies formally represented in its make-up.

have drawn into the law of this country intricacies which might at least have been avoided, and the problem for us is to get that line made straight, and therefore, in advance of the publication of my report, I confide to you the fact that I have given my endorsement and made an appeal to Congress for the establishment of a Commission that would revise the mining laws.

SEES BRIGHT FUTURE

"Ten years from now, or twenty years from now, you gentlemen I trust, will return to Washington and you will find then a far greater interest taken in your profession because the world will then have realized how absolutely dependent upon the mineral production is the development of an industrial people. The theory was, 120 years ago, that we could live well as a body of agriculturists and that this country could be happy and maintain itself as a democracy only if we were farmers. Some way or another by the adventure of your predecessors we have discounted that idea and the more we advance as an industrial people the more we realize that the very foundation of our hope lies not only in those things that are above ground, but in those things which are under the ground. To reveal their mysteries and develop them is the purpose of the Department at the head of which I am, but we need the support of the mining men of the country and the sympathy of Congress."

CALL ON TAYLOR

At the request of those assembled, Representative Edward T. Taylor of Colorado was called to the platform to explain in detail the bill which he has introduced in the House of Representatives looking to a revision of the mining laws. Mr. Taylor read his bill. He told of his efforts during the seven years that he has been a member of the Committee on Mines and Mining to pass a measure on the lines of the one he has presented this year. Mr. Taylor went to Leadville, Colorado thirty-five years ago and feels that through his intimate knowledge with mining conditions in the West he is thoroughly able to judge of the methods best suited to mining conditions which have a chance of passing.

Incidentally, Mr. Taylor told of his efforts to secure the passage of the bill which provides for ten mining experimental stations. Mr. Taylor stated that one of these stations probably will be located in Alaska and the other two in the United States. He believes there will be no question as to passage of a bill providing the appropriation for the opening of these stations.

Mr. Taylor told of the difficulties which has surrounded his work in the House. Even on the Committee on Mines and Mining, which consists of fourteen members, he is the only member from a metal mining district. In spite of the various handicaps which existed at the last session of Congress, Mr. Taylor was able to get a favorable report on his bill.

EXPLAINS BILL

Mr. Taylor compared his bill, with that of Senator Smoot which passed the Senate at the last session. He pointed out that the principal diff-

erence between the bills is that Senator Smoot's asks for a salaried commission, where as Mr. Taylor believes his bill will have better standing in the House of Representatives if the commission is an honorary one.

Mr. Taylor stated that he believes high class commissioners can be secured who will serve without salary. He believes the commission should be paid for its services, but that the objection in the House of Representatives to commissions, of which there have been so many during recent years, is such as to militate in the passage of any bill which provides for a commission. He also dislikes the clause in his bill which provides for the exemption of lands containing coal, phosphate and other substances. This clause however was made necessary by the attitude of the administration and of the Secretary of the Interior who will oppose any bill which would interfere with their leasing plan. Mr. Taylor read an extensive extract from the Committee Report on his bill. He spoke highly of D. W. Brunton of Denver, from whose remarks before the Committee he read extensively.

PRESSURE NECESSARY

There are 40,000 bills introduced at each session of Congress, Mr. Taylor pointed out, and of this number only two per cent go through. He called attention to the fact that in order to pass the bill there must be great pressure behind it. It particularly is the case with the bill providing for the revision of mining laws, as it is metalliferous mining which is principally interested. Coal mining, he said, is not concerned to the point of taking any energetic action to secure the passage of the bill. Since there are only thirty-six Congressmen from metal mining districts it is absolutely necessary that pressure be brought by the public, Mr. Taylor said.

Following Mr. Taylor's remarks, Mr. Scholz urged that each member consider it his duty to use all influence that he can bring to bear on Congressmen from their districts to take an active interest in the matter of securing revision of the mining laws.

Secretary Sharpless then read the bill of Senator Smoot. Instead of a commission of five, as provided by the House bill, Senator Smoot's commission is to consist of three members, one of which is to be a practical miner and the other two to be attorneys with large experience in handling mining laws.

When the matter was thrown open to discussion, Mr. Macbeath, of Idaho, stated that he represents 1,100 mining men in his state, who object strenuously to having two attorneys on the commission. He suggested that there be one engineer, one practical mining man and one lawyer, on the commission. Mr. Macbeath, along with others made decided objection to the feature of Mr. Taylor's bill which recognizes the Government's leasing plan.

CANNOT OPPOSE LEASING

At this point Mr. Taylor called attention to the fact that ninety-five per cent of all bills passed by the House of Representatives are with unanimous consent. He said there would be absolutely no chance of passing his bill, if it conflicted with the federal leasing policy being backed by the administration. Mr. Taylor stated that he believes it would be best to secure all the other benefits which his bill provides, rather than postpone indefinitely these advantages, because of the general dislike on the part of western men to the leasing plan. It will be a comparatively simple matter, Mr. Taylor explained, to amend the bill in case the leasing bill should fail at this session.

Some objection was voiced to the appointment of the commission by the President. Mr. Taylor believes that it would be best to have the President undertake this work in order to get away from the delay which would be occasioned by arguing the details of the personnel of the commission on the floor of the House.

HAVE DATA ENOUGH

Judge J. W. Thompson, of the Bureau of Mines, asked what information can be gained by a commission as is proposed by the bills of Senator Smoot and Representative Taylor. He intimated that sufficient data is at hand to formulate intelligent mining laws without the delay and expense which would come through an extended investigation made by a special commission.

Horace V. Winchell, of Minneapolis, gave it as his opinion that it is very necessary that a commission make a careful study of the matter of the revision of mining laws before any action is taken. Mr. Winchell has been in charge of the investigation made by the Mining and Metallurgical Society with the view of learning just what the mining interests of the country want in the way of revision. Thousands of letters were received by Mr. Winchell and the difference of opinion is very marked. He believes that a great deal of careful and systematic work will be necessary before an effective mining code can be arranged.

It would be necessary for the commission to take testimony in most of the principal mining camps, and to make a detailed study of mining laws and their effect in other countries.

Mr. Keller, of Lead, S. D., strongly endorsed the view expressed by Mr. Winchell, and also stated that South Dakota mining men almost unanimously favored a commission which will serve without pay. He says there are many big men in the mining industry who put patriotism above dollars.

Mr. Ross, of Washington, declared that the miners of the Northwest had lost heart and faith in securing action toward getting better mining laws. The inefficiency of American laws is accentuated, in Washington, due to the close contact with mining conditions in British Columbia. Due to the general belief that efforts of mining men are accomplishing nothing in the campaign for better laws, there was much opposition to sending a delegate to this meeting. At first it was decided absolutely not to participate, but finally in the hope that some little good might result, Mr. Ross was sent to Washington.

Mr. Winchell declared that Congress must not only be asked to make this necessary change in the laws and relieve the mining industry of a

(Continued on page 40)

PRODUCTION OF AMERICAN MINES REACHES HIGHEST POINT IN 1915

Output for Year Just Ended Will Reach $2,500,000,000—Copper, Iron and Zinc Show the Largest Increases—More Than $120,000,000 Worth of Zinc—Gold and Silver Yield Larger

During the year just closed the mining industry in the United States made the best showing in its history. In all probability the mineral producton of the country for the last twelve months will amount to $2,500,000. Remarkable increases in production have taken place in practically every mining State of the Union. The increase in Montana over 1914 is 81 per cent, and in New Mexico is 60 per cent. The showing made in other States is little less striking.

One of the notable features of the announcement is that practically exact figures of production were furnished within a few days after the close of the year. This is made possible by the wonderfully efficient organization of the United States Geological Survey. Dr. George Otis Smith, the director, believes that one of the important necessities in the collection of data is that the results be made public as early as is possible. As a result of this policy the country will be informed during the first week of the new year as to the output of its mines during the year just closed.

The midyear review of mining conditions reported to the Secretary of the Interior on July 1 by the Director of the United States Geological Survey is well supported by the preliminary reports for the year submitted today. The Geological Survey is making public is usual estimate of mineral production for 1915 in the form of a separate statement for each of the more important mineral products.

A review of these statements confirms Secretary Lane's comment of last July to the effect that the mining revival is in full swing. In the Western States alone the metal production shows an increase in value of more than $130,000,000 over the corresponding figures for 1914; and the year's increase in output for the principal metals, measured in value, is more than $250,000,000.

In the response to bettered conditions the production figures for copper, iron and zinc show the largest increase.

COPPER BEATS ALL RECORDS

The copper mines passed all records for previous years, the 1915 output having a value of $236,000,000, or $83,000,000 more than the value of the production for 1914. The statistics and estimates received place the output of blister and lake copper at 1,365,500,000 pounds, or more than 120,000,000 pounds in excess of the largest previous production, and 18 per cent above last year's figures. Only twice in the history of copper mining has there been a larger increase in quantity of metal produced.

LARGE INCREASE IN IRON

The total shipments of iron ore from the mines in the United States in 1915 are estimated to have exceeded 55,000,000 gross tons, an increase over 1914 of more than 38 per cent. Based on the same price as received in 1914, this represents an increase in total value of about $27,645,000. The increase in pig iron is estimated at 6,500,000 tons, with a total increase in value of pig iron production of more than $120,000,000.

ZINC RECORDS ALSO BROKEN

The output of zinc (spelter) made from domestic ores was larger than ever before, being about 425,000 tons, worth $120,000,000, as compared with 343,418 tons in 1914, an increase of about 82,000 tons, or nearly 25 per cent in quantity, and of $85,000,000 in value. Production was increased during the latter half of the year, as the production during the first half, was at the rate of 415,000 tons annually and at the rate of 436,000 tons during the last half.

The output of refined pig lead from domestic ores was about 515,000 tons, worth about $48,500,000, as compared with 512,794 tons in 1914, an increase of only 2,500 tons in quantity, but of $8,500,000, or 20 per cent in value. The production of antimonial lead was 20,550 tons, as compared with 16,668 tons in 1914, an increase of 3,882 tons, or 23 per cent in quantity, and an increase in value of nearly $2,000,000.

GOLD AND SILVER INCREASES

The annual preliminary estimates on the production of gold and silver in the United States, made jointly by the United States Geological Survey, and the Bureau of the Mint, are not yet complete, but early figures, based on reports from the mines indicate an increase in mine production over that of 1914 of over $7,000,000 in gold, principally from Colorado, California, Alaska, Montana, and Idaho, and an increase in mine production of silver of fully 4,000,000 ounces, chiefly from Montana, Utah, and Arizona. This increase in gold production may bring 1915 up to the record year of 1909, when the gold output of this country was nearly $100,000,000.

Quicksilver also has had its best year in

1915. The quantity increased 25 per cent over 1914, but the value of the output more than doubled, owing to the much higher prices. The estimated production was 20,681 flasks of 75 pounds each, valued, at the average price for year—the highest in the last forty years—at $1,768,225. In value, this domestic production was the highest since 1881 and in quantity the largest since 1912.

SMALL CHANGES IN COAL

The production of bituminous coal and anthracite in 1915 is estimated to have increased between four and five million short tons, or less than 1 per cent. The quantity of bituminous coal mined increased about six and one-half million tons, and that of anthracite decreased over two million short tons. Owing mainly to steady demands for export coal and for coke for steel making, the output in Pennsylvania, West Virginia, Kentucky, and Alabama increased over last year, but little change is recorded in other Eastern States. The region west of Ohio, including the Mississippi Valley, shows a general decrease, Colorado being the only Western State to show betterment.

Connected with the coke industry was the completion during the last summer of a number of large plants for the recovery of benzol from by-product coke-oven gas. This gives the United States its first output of this material, so important as a raw material in the manufacture of high explosives and chemical dyes, and the amount of this product will be reported later.

Preliminary estimates of the total output of petroleum in the United States in 1915 indicate a slight increase over the corresponding output in 1914. It is believed that the total petroleum yield of the United States in 1915 amounted to 291,400,000 barrels, of which quantity it is also estimated that 267,400,000 barrels was marketed, and 24,000,000 barrels placed in producers' field tankage during the year.

The sulphuric acid industry in 1915 presented interesting development. In spite of the abnormal demand and higher prices in the latter half of the year, much of the sulphuric acid had been contracted for or was consumed in the factories where made. The estimated production indicates an increase of 6½ per cent in the three common grades, but more than 100 per cent in the strongest grades.

The estimate of Portland cement output in 1915 indicates shipments from the mills of 86,524,500 barrels, an increase of one-tenth of one per cent over 1914. There was a slight decrease in production and this, with the appreciable decrease in stock, indicates a more conservative trend in the industry, which in the preceding few years showed a tendency to overproduction. Prices generally averaged a few cents lower per barrel in 1915 than in 1914, although toward the end of the year prices were substantially increased, and the outlook for 1916 is brighter than for several seasons.

IN WESTERN STATES

Perhaps the most notable item in the year's record is the stimulation of metal mining in the Western States. Almost without exception the increases in production were large and in several States 1915 was the best year on record. In Arizona, which leads in copper, the output of that metal exceeded the previous record production of 1913. California continues to lead in gold and had the largest yield in thirty-two years, and with one exception in half a century. In Montana and Arizona record outputs of silver are reported, and in Alaska the increased production of gold, and especially copper, made 1915 a much more prosperous year than even 1906, when Fairbanks and Nome were yielding their greatest returns of gold from bonanza placers.

NATIONAL ZINC COMPANY LOSES DUTY PROTEST

The National Zinc Company has been overruled in an important protest before the board of general appraisers in the matter of additional duty on zinc bearing ore from Canada and Mexico. General Appraiser Hay wrote the opinion of the board. Boiled down it is as follows:

1. Manifest Clerical Error.—There can be no manifest clerical error within the meaning of that phrase as used in paragraph I of section 3, tariff act of 1913, where the record discloses that the value stated upon entry though too low was deliberately so stated.—Meyer Bros. Drug Co., G. A. 5667 (T. D. 25257), United States *v.* Wyman & Co. (4 Ct. Cust. Appls., 264; T. D. 33485).

2. Contemporaneous Administrative Construction.—A practice in the collector's office in the liquidation of an entry of merchandise bearing a specific rate of duty will not be held to be a contemporaneous construction of the law when that duty is changed from a specific to an ad valorem rate, even though the practice is not changed for some time after the change in the law.

3. Change from Specific to Ad Valorem Rate.—The change by Congress from specific to ad valorem duty on merchandise carries with it all of the provisions of existing law that apply to the administration of the customs in the assessment of ad valorem duty upon imported merchandise.

4. Zinc-Bearing Ore—Additional Duty.—Under paragraph 162 of the tariff act of 1913, the zinc contained in zinc-bearing ore is made dutiable at 10 per cent ad valorem. If the unit value is not stated in the entry, but the total value when reduced to units is less than the unit appraised value, the additional duty provision of paragraph I is properly applied by the collector in assessing duty.

"I hope that in course of time we will develope for the mines of the West and the mines of the East an interest just as strong as the government has shown for the farmers."—Franklin K. Lane, Secretary of the Interior.

MONTANA PRODUCES MORE METALLIFEROUS ORES THAN EVER BEFORE IN HER HISTORY

Increase Over Last Year's Production is Eighty-one Per Cent—Output of Copper Runs as High as 22,000,000 Pounds a Month—Spelter Shows Increase of Sixty-one Per Cent

The value of the output of gold, silver, copper, lead, and zinc from Montana mines in 1915 was nearly $87,000,000, an increase of more than 81 per cent over the total value of the same metals in 1914, which was $47,849,747, and is the greatest annual value of metals produced in Montana. There were increases in the output of all metals, but especially of lead and zinc. Though quantities show increases, the large increase in value was even more the result of a great rise in prices. The figures are derived from preliminary estimates by Victor C. Heikes, of the United States Geological Survey.

The mine output of gold was valued at nearly $5,000,000 against $4,117,911 in 1914, an increase of over 21 per cent. There was a larger gold output from placers, particularly from dredging in Alder Gulch, in Madison County. The production of gold from siliceous ores also increased, especially from the Barnes King property in Fergus County, and, stimulated by better prices for the base metals during the later part of the year the gold yield from copper ores, lead ores, and zinc ores was greatly increased. The Kendall mine was productive through lessees, and in the later part of the year was purchased by the Barnes King Co. In July the Lane mills, at the Piegan-Gloster mines, began operations. In Lewis and Clark County, at the Porphyry Dyke property, a 20-stamp mill was operated on low-grade ore until it was closed on account of a water law suit.

SILVER SHOWS GAIN

The mine output of silver in Montana increased from 12,016,460 ounces in 1914 to about 14,500,000 ounces in 1915. This output shows an increase of nearly 21 per cent and is even greater than that of 1913, which was the record up to that time. The increase was due not only to the enlarged output of copper ore, which supplies the greater part of the silver, but to the great impetus given to the marketing of zinc ores. As the average price of silver was less than 50 cents an ounce in 1915, the value of the output was only increased about $595,000.

Montana's greatest asset is copper, the output of which increased from 233,229,640 pounds in 1914 to nearly 275,000,000 pounds in 1915. This was an increase of nearly 18 per cent over 1914, but the output did not reach that of 1913. In the early part of the year the mines were adjusting themselves to conditions imposed by the European war, but as the price increased from 13.60 cents in January to 19.75 cents in July, every effort was made to market the metal. According to the published monthly output of the Anaconda works, the copper production increased from nearly 14,000,000 pounds in January to over 22,000,000 pounds per month in the middle of the year. Production at the East Butte smelter was resumed in May, and the plant was said to be making 2,000,000 pounds of copper in July. In October the smelter was overhauled and a flotation plant was installed. The Butte and Duluth, from which copper was produced by leaching in 1914, was idle in 1915 on account of financial difficulties. The leaching plant at the Bullwhacker mine was not operated, but in the latter half of the year considerable copper ore was being shipped to the smelter from this property. The North Butte Co. produced nearly 8,000,000 pounds of copper during the first half of the year, and considerably increased the rate of production toward the end of the year, as did several other copper mines in the same district.

GREAT GAIN IN LEAD

The mine output of lead increased considerably—from 9,656,008 pounds in 1914 to slightly over 14,000,000 pounds in 1915. This increase of over 45 per cent was due largely to the shipment of lead concentrates and of residues resulting from zinc smelting. Both the Butte and Superior and Elm Orlu zinc mines produced a lead concentrate. The Franklin mine and the Valley Forge mine, in Lewis and Clark County, and the Iron Mountain mine at Superior, contributed to the lead output. The latter property was acquired in July by the Federal Mining & Smelting Co., of Wallace. The value of the lead output increased from $376,584 in 1914 to about $651,000 in 1915.

The mine production of zinc increased from 111,580,544 pounds (figured as spelter) in 1914 to 184,086,000 pounds in 1915. The spelter output represented an increase of nearly 61 per cent in quantity, but as the price of the metal increased from 6.30 cents in January to 22.2 cents in June there was an increase in the value of the output from $5,690,608 in 1914 to over $26,000,000 in 1915. The two main producers were the Butte and Superior and Elm Orlu mines, at Butte. Lesser outputs came from tailings concentrated at Basin; from the Iron Mountain mine, in Mineral County (formerly Missoula County); the Sil-

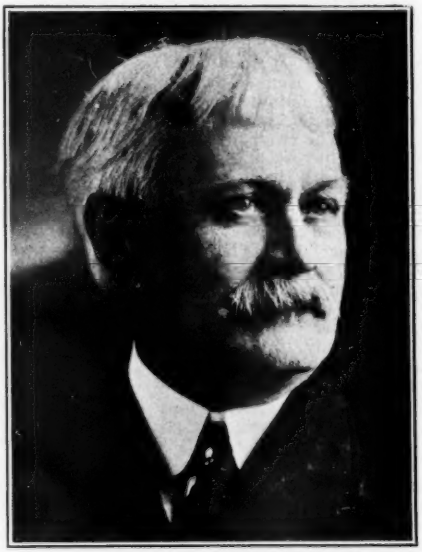
ver Cable mine, near Taft; and a property near Victor, in Ravalli County. The Anaconda Copper Co., in the latter part of the year, entered the zinc field by constructing an electrolytic plant, and some of the product was marketed before the close of the year. Some mines of this company at Butte are being developed for zinc ore.

The largest dividend payers were the Anaconda, Butte and Superior, and North Butte.

OREGON IS IN NEED OF CAPITAL FOR DEVELOPMENT

Preliminary estimates of the output of metals from Oregon mines in 1915, by the United States Geological Survey, show material increases over the figures of 1914 in both gold and copper, and slight decreases in yield of silver and lead. The gold yield for 1914 was $1,591,461 and the estimate for 1915 is $1,771,618 which is an increase of $180,157 for 1915. The silver output for 1914 was 142,552 ounces, and the estimate for 1915 is 136,033 ounces, or 6,519 ounces less. The yield of copper in 1914 was 39,248 pounds, while the estimate for 1915 is 910,104 pounds, an increase for 1915 of 870,856 pounds; and the yield of led was 16,436 pounds in 1914, as compared with 6,650 pounds in 1915, or 9,786 pounds less. These preliminary figures are compiled by Charles G. Yale, of the San Francisco office of the Survey.

It is noteworthy that such material increases in output of gold and copper should be apparent when the fact is considered that the number of producing mines in Oregon has fallen off fully one-third in the past two years. Those which have dropped from the producing list, however, have been mainly small placers of various kinds where the ground has been worked out, or has failed to pay. The larger deep mines continue their productive career, with few exceptions, but not many new properties of moment have of late been opened. More capital for mine development is needed in the State, where there are few extensive properties in operation. Baker county continues to be by far the most productive county of the State, yielding annually full 85 per cent of all the gold. The most productive deep mine in Oregon in 1915, as also for the preceding two years, was that of the Commercial Mining Company, operating the Rainbow mine in Cracker Creek district, Baker County. This property is shortly to be turned back to its original owners. Among other large producers in the same county is the Cornucopia Mining Company, in Cornucopia district, which in 1915 increased its output for the reason that they encountered higher grade ore on the lower levels than they had before. The Baker Mines Company, in the same district, has put in a 500-ton mill, and has been operating most of the year. In Cracker Creek district, also in Baker County, the Columbia Mines Company made about the same yield as in the previous year. The output of the Humboldt property, in Mormon Basin district, Malheur County, was not as high as in 1914. The Ben Harrison mine, in Granite district, Grant County, was closed down most of the year 1915 and will not begin operations until next spring. Of the placer mines in Oregon, most important enterprise is that of the Powder River Dredge Company, Cracker Creek district, Baker County. This company, which owned but one dredge in 1914, put another one in operation in the same field in 1915, and it is to the work of this company that the increase in gold yield in the State for the year is mainly due. Other placer mines are the Osgood, Waldo district, Josephine County; the Layton, in Applegate district, Jackson County; and the smaller mines around Grants Pass, in Josephine County. The gold yield from the dredging operations is greatly in excess of that from all other forms of placer mining combined.



CHARLES E. MUNROE

Noted chemist who took prominent part in the Pan American Scientific Conference.

"I want to see the Bureau of Mines erected into a great power not only to emphasize to the people of the United States the magnitude of the wealth and resources that we have in our mines, but the possibility of making the United States strong and independent and self-sufficient."—Franklin K. Lane, Secretary of the Interior.

ARIZONA MINES PRODUCE NEARLY 50 PER CENT MORE THAN IN 1914

Nearly $26,000,000 More Copper Sold during Year Just Closed than During Previous Twelve Months—Zinc Sales Show an Increase of More Than $2,000,000—Gold Output Remains About the Same

The output of gold, silver, copper, lead, and zinc at mines in Arizona in 1913 was valued at $88,551,000, according to the United States Geological Survey, an increase of nearly 48 per cent from that of 1914, which was $59,956,029. There was very little change in the output of gold, but there were notable increases in the other metals, especially in lead and zinc. Increased prices made a difference of nearly $26,000,000 in copper, $400,000 in lead, and over $2,000,000 in zinc. These figures are the estimates of V. C. Heikes, Statistician, of the Survey.

The output of gold in Arizona mines increased about 1 per cent from that of 1914, which was $4,179,153. Gold production from copper ores increased, as every effort was made to market copper bullion when the price advanced, but gold from siliceous ores decreased, three of the largest producers of the State having a combined decrease of about 30 per cent in gold and silver bullion. The Commonwealth mine, at Pearce, was also a large producer, though the main value of the bullion was in silver. The discovery of gold near the Tom Reed mine at Oatman was of interest in 1915. There was considerable activity in the camp, where a large body of gold ore is said to be opened at the United Eastern property, east of the Tom Reed mine. In August about 20 tons were being shipped daily to the Gold Road Mill, and later in the year preparations were made for building a 200-ton mill.

SILVER PRODUCTION INCREASES

A record production of silver was made from Arizona mines in 1915, the output increasing from 4,377,994 ounces in 1914 to about 5,458,000 ounces in 1915, or over 24 per cent. The value of this output increased to about $2,718,000. The greater part of the silver, as formerly, came from the copper ores, but the increase in the shipments of silver-lead ores also contributed to the increase. The silver production from zinc ores and lead-zinc ores is not great, but siliceous ores in Cochise County supply a material percentage. The Commonwealth mine, at Pearce, was treating approximately 10,000 tons of ore a month, making bullion containing principally silver. At the Tombstone property, operated by the Bunker Hill Mines Co., ore and tailings were being treated by cyanidation toward the end of the year. Work was resumed at the McCracken silver mine in the Owens District of Mohave County, for which a mill is planned.

Arizona is the leading copper-producing State of the country and had an output of nearly 450,000,000 pounds in 1915, an increase in quantity of nearly 57,000,000 pounds and in value of nearly $26,000,000. In the latter part of 1914 many of the copper mines had been closed or worked on a 50 per cent basis. As the price of copper increased in 1915 from 13.60 cents a pound in January to 19.75 cents in June, mines and smelters took advantage of the rise in price and toward the end of the year were producing at more than the normal rate. Great increases were made at the smelting plants at the Calumet and Arizona, Copper Queen, United Verde, Hayden, International at Miami, and Consolidated Arizona at Humboldt. The new plant of the International S. & R. Co. was started the middle of the year and treated concentrates from the Miami Copper Co. The new smelter of the United Verde was blown in May 18 and the old smelter closed August 21. On account of floods in April, the Old Dominion plant did not increase its output for the year, and on account of the strike in the Clifton-Morenci district in September, the output of the Detroit, Arizona Copper, and Shannon smelters was greatly decreased. At the Inspiration property the new mill using concentration and flotation was treating 5,000 tons a day in October. The Ray Consolidated, during the first three-quarters of the year, produced nearly 44,000,000 pounds of copper, or at the rate of a little less than 5,000,000 pounds a month.

LEAD SHOWS GAIN

The mine output of lead in Arizona increased from 15,003,068 pounds in 1914 to about 22,272,000 pounds in 1915, an increase of over 48 per cent. The value increased from $585,120 to $1,033,000. The greater part of this output comes from the Copper Queen and Shattuck properties, in the Warren district, in Cochise County. The Tennessee mine, in Mohave County, produced a lead-zinc ore, treated at Needles, from which lead concentrate and zinc concentrate were shipped.

The mine production of zinc, estimated as recoverable spelter, increased from 9,792,337 pounds in 1914 to about 17,729,000 pounds in 1915, an increase of 81 per cent. The unusual average price of zinc for 1915 gives a value of about $2,524,000 to this product. It came almost entirely from the Golconda and Tennessee mines, in Mohave County. A few other zinc shipments were made from Pearce and Hereford, in Cochise County; Casa Grande, in

Pinal County; Red Rock, in Pima County; and Crown King, in Yavapai County. The Texas Arizona property, in the Cochise district, and the Duquesne property, in Santa Cruz County, also made a few shipments of zinc ore.

For the first eleven months of 1915 the metal mines of Arizona contributed nearly $11,000,000 in dividends. The principal dividend payers were the United Verde, Miami, Calumet and Arizona, Ray Consolidated, Superior and Pittsburgh, Old Dominion, Shattuck, Azirona Copper, United Globe, Tom Reed, and Magna.

CALIFORNIA OIL MEN'S PROTEST CONVINCES MANY

The delegation of Pacific coast business men who have been in Washington since the opening of Congress, asking for legislative relief from the impossible conditions in the California oil region, is deserving of prompt attention, says the Washington Times. Seemingly everybody who has taken the trouble to make even cursory examination into the merits of their case, has been convinced. Congress ought to act just as quickly as measures can be formulated that will assure both the public interest and the business concerns of the oil producers.

It is not worth while now, to discuss the responsibility for the unfortunate conditions in California. More than six years ago President Taft, acting doubtless on what at the time was supposed to be good advice and in the public behalf, issued an order withdrawing a great area of oil lands from entry. Many of these lands had been taken up under the placer law, and were in process of development. The withdrawal order broke down all certainties as to title, made it impossible to secure credit based on values known to exist, destroyed the market for the oil produced, and pitched the whole business into confusion.

If any real public interest had been served by this act there would have been excuse for letting bad conditions continue indefinitely, as they have done. But in fact the oil field is in more danger of being ruined than of being conserved. There is great danger that surface waters will work their way into the oil-bearing strata and "drown out" the field. Once opened, the wells must be continuously pumped, or they may become the means to ruin of the entire area.

There was a time when this condition was not well understood, and when suspicion attached to every effort at relieving the industry. Anybody connected with oil was presumed to be trying to rob the Government or the people; to get something for nothing and then sell it for several prices. Fortunately that attitude is no longer generally entertained. Something like real intelligence is beginning to be employed in consideration of such conditions as those in California; and it ought to be safe for Congress to deal honestly and directly with these conditions. California and the whole country actually need relief. The present session ought to provide it without delay.

URGES COOPERATION AMONG MINERS AND THOSE IN OTHER PURSUITS

In an address before the Arizona Chapter of the American Mining Congress recently, Andrew Kimball said in part:

"Thus through cooperation, home industry, economy and careful management through this early training, our neighbor State on the north—Utah—is today manufacturing over $70,000,000 worth of various articles, and her people are becoming wealthy from these industries.

"Not alone home industries, mining has made more money for Utah than anything else. A prominent Utonian, recently my guest, said to me, 'The marble fronts of the palatial homes of Salt Lake have come from the earnings of mines, and were it not for the proceeds of the rich and valuable mines about Salt Lake, we would be wading through muddy streets yet in some places. Mines have made possible these improvements. The laws of Utah encourage mining.'

"What we need in Arizona more than anything else today is the get-together spirit, home industries, patriotism, loyalty to State and her interests. To bring this about—let me venture some suggestions:

"Agriculture is the foundation of any commonwealth and without a foundation there can be no firm superstructure. The leaders of the people who laid the foundation of the settlement of this western world, struck it right when they held the people together in agricultural pursuits. In Arizona we must encourage agriculture, thereby get a stable population. A class of conservative home-building people, taxpayers, a population of responsible and intelligent citizens. This will do it. Agencies with which to do this are such as the Arizona Chapter of the American Mining Congress, and the State Taxpayers' Association of Arizona, and other like organizations.

"I am not a miner, but I have a place with this organization. There is nothing more helpful to agriculture than a good market. When the mines do well, the farmer can sell his produce, the stockman his meat, the horticulturist his fruit, the creamery its butter and cheese. Our mills and factories have business. Everything about a farming community means for the best when the mining interests are up and doing well. Then as a farmer and associated in the colonizing business, my life work is among the tillers of the soil. Then I am in my line of duty, as I see it, when I lend my influence along the lines of development of the mining industry."

Assistant Metallurgist Needed.

Civil service examinations will be held January 25 at various points throughout the United States for an assistant metallurgist to fill a vacancy in the Bureau of Mines. The salary for the work involved ranges from $1,800 to $3,000 a year.

CRIPPLE CREEK INCREASES ITS GOLD OUTPUT BY MORE THAN $1,500,000

Colorado's Metal Mines Make Remarkable Showing during 1915—Gold Output for the State Passes $22,000,000 Mark—Silver Output Decreases

The mine output of Colorado metals for eleven months of 1915, with an estimate for December, from data compiled by Charles W. Henderson, of the United States Geological Survey, indicates a yield for the year of $22,330,000 in gold, 7,080,000 ounces of silver, 66,664,000 pounds of lead (in terms of lead in lead bullion and lead in leaded-zinc oxide), 7,100,000 pounds of copper, and 100,000,000 pounds of zinc (in terms of spelter and zinc in zinc oxide), with a total value of $43,100,000, compared with $19,883,105 in gold, 8,796,065 ounces of silver, 74,211,898 pounds of lead, 6,639,173 pounds of copper, and 96,774,960 pounds of zinc, with a total value of $33,460,126 in 1914. This shows an increase of $2,447,000 in gold, decrease of 1,716,000 ounces of silver, and 7,550,000 pounds of lead, an increase of 306,000 pounds of copper, and 3,200,000 pounds of zinc. With the increased average value of metals, except silver, the values show a decrease of $1,380,000 for silver, an increase of $300,000 for lead, an increase of $340,000 for copper, and an increase of $8,065,000 for zinc.

The tonnage treated by the Globe, Leadville, Pueblo, Durango, and Salida smelters was approximately the same as in 1914. Increased shipments of copper ore were made from Rico to plants in Utah and copper matte was shipped from Ouray to Utah. Cyanide precipitates and copper ore were shipped to Omaha. Some Rico ore was shipped to San Pedro, New Mexico. The matting plant at Ouray was operated during the greater part of the year. The tonnage treated at the United States Zinc Co.'s magnetic-wet concentration mill and smelter at Pueblo showed a heavy increase. The Western zinc oxide plant at Leadville was placed in successful operation in April and operated throughout the year on Leadville zinc carbonates.

CRIPPLE CREEK BREAKS RECORD

The gold output of Cripple creek (Teller County) was $13,539,245, an increase of $1,543,129. The yield was also $507,328 larger than the 1908 yield, which was the largest yearly output since 1906. Cripple Creek, to the end of 1915, has produced $272,326,000. The Roosevelt tunnel continued to lower the water in the mines, except in the Vindicator-Golden Cycle, where electric pumps are used. Several shafts were extended to the depth of 1,900 to 2,000 feet. Work on the extension of the tunnel stopped November 4, 1914, when the El Paso plant was destroyed by fire, was resumed March 2, 1915, the tunnel then being 17,127 feet long. Toward the end of the year the tunnel was approaching the Elkton property and the flow was in excess of 15,000 gallons per minute.

The Golden Cycle cyanidation mill at Colorado City, and the Portland cyanidation mills at Colorado Springs and Victor, were operated steadily with an increased output. The Stratton's Independence mill was included in the sale of the mine to the Portland Company. The Union cyanidation plant at Florence was idle and the smaller plants in the district were not as actively worked as heretofore. The tonnage of smelting ore increased appreciably. The discovery of a body of exceptionally high grade ore in the Cresson mine in December, 1914, resulted in a greatly increased output of the district for the first quarter of the year 1915.

Lake County, chiefly from Leadville, but also including the Lackawanna Gulch and St. Kevin lode districts and the Arkansas River dredge district, produced $2,261,000 in gold, 2,660,000 ounces of silver, 20,000,000 pounds of lead, 1,840,000 pounds of copper, and 71,000,000 pounds of zinc, with a total value of $14,000,000, against $1,571,451 in gold 3,810,830 ounces of silver, 26,784,615 pounds of lead, 2,382,910 pounds of copper, 78,763,334 pounds of zinc, with a total value of $9,057,297 in 1914. Metallic gold was shipped during the year from the Ibex and Third Venture mines. The output of zinc carbonate was 80,000 tons of 22 per cent zinc, against 113,881 tons of 24.3 per cent in 1914. The zinc sulphide smelting ore and concentrating ore combined was 135,000 tons of 24 per cent zinc, as compared with 111,947 tons of 21.2 per cent zinc in 1914. Operations were resumed in April at the 50-ton zinc oxide plant, and it was operated successfully during the year on zinc carbonate ores of 16 per cent or less. The Pingreo flotation plant was operated on zinc-lead sulphide ores from Leadville and Red Cliff. The water in the down-town mines was lowered by electric pumps to nearly 700 feet at the Penrose shaft. The Derry Ranch dredge, below Malta, began operations in October and thence on regular shipments of bullion were sent to the Denver Mint.

SAN JUAN RICH IN MINERALS

The San Juan region of Dolores, La Plata, Ouray, San Juan, and San Miguel Counties produced $3,890,000 in gold, 2,250,000 ounces of silver, 13,800,000 pounds of lead, 3,530,000 pounds of copper, and 4,000,000 pounds of zinc, as compared with $3,969,857 in gold, 2,515,437 ounces of silver, 11,861,766 pounds of

lead, 2,379,639 pounds of copper, and 1,382,334 pounds of zinc, in 1914. There were increases for gold of $3,700 in Dolores, and $68,500 in San Juan County, but decreases of $51,400 in La Plata, $37,500 in Ouray, and $25,800 in San Miguel. There were increases for silver of 36,000 ounces in Dolores, but decreases of 12,000 ounces in La Plata, 2,000 ounces in Ouray, 95,000 ounces in San Juan, and 191,000 ounces in San Miguel. Dolores County (Rico) showed an increase of 630,000 pounds of copper, but a decrease of 235,000 pounds of lead. Ouray County's yield of lead and copper showed little change. San Juan showed an increase of 1,400,000 pounds of lead, and 200,000 pounds of copper, and San Miguel County showed an increase of 960,000 pounds of lead and 340,000 pounds of copper. The Sunnyside Mine of San Juan County made a greatly increased output of zinc concentrates in 1915, and the Smuggler Union Mine, of Telluride, began shipping zinc middlings in large tonnages in January, 1915. No zinc middlings were shipped from the Tomboy group in 1915.

Boulder County's production was $165,000 in gold, 264,000 ounces of silver, 820,000 pounds of lead, and 70,000 pounds of copper—an increase of $66,000 in gold, a decrease of 48,000 ounces of silver, an increase of 294,000 pounds of lead, and an increase of 45,000 pounds of copper.

Chaffee County produced $322,000 in gold, 235,000 ounces of silver, 3,678,000 pounds of lead, 306,000 pounds of copper, and 3,670,000 pounds of zinc—a slight decrease for all metals, except zinc, for which there was an increase of 1,500,000 pounds.

Clear Creek County's output was $547,000 in gold, 376,000 ounces of silver, 2,370,000 pounds of lead, 560,000 pounds of copper, and 1,500,000 pounds of zinc—an increase of $52,000 in gold and 30,000 ounces of silver, 190,000 pounds of copper, but a decrease of 62,000 pounds of lead, and an increase of 500,000 pounds of zinc.

Gilpin County's output was $559,000 in gold, 130,000 ounces of silver, 544,000 pounds of lead, and 420,000 pounds of copper, including ore mined through the Argo tunnel.

The Pitkin County (Aspen) yield was 411,000 ounces of silver and 19,000,000 pounds of lead—an increase of 40,000 ounces of silver, but a decrease of 4,350,000 pounds of lead.

CREEDE SHOWS GAINS

Creede (Mineral County) produced $35,400 in gold, 308,000 ounces of silver, 2,400,000 pounds of lead, 13,000 pounds of copper, and 200,000 pounds of zinc—an increase of $16,000 for gold, a decrease of 300,000 ounces of silver, but an increase of 1,000,000 pounds of lead and 200,000 pounds of zinc. The tonnage of crude ore shipped from Creede decreased, but the operation of the Humphreys mill (idle in 1914) increased the yield of lead and zinc. A considerable quantity of zinc concentrates has been stored.

Hinsdale County's production was not large but showed an increase for silver and lead, and an improvement in activity in considerable contrast to a practical idleness in 1914.

With the revival of gold mining at Ohio City and the discovery and operation since July of a large deposit of zinc carbonate at the Doctor Mine, in the Elk Mountain district, with shipments of zinc sulphide from Whitepine, Gunnison County yielded $55,000 in gold, 23,000 ounces of silver, 220,000 pounds of lead, and 1,800,000 pounds of zinc—an increase of $42,000 in gold, a decrease of 36,000 ounces of silver, a decrease of 94,000 pounds of lead, but an increase of 1,300,000 pounds of zinc. Shipments of copper ore began in October from the old Vulcan property, at Vulcan. The dredge at Tincup, moved in 1914 from Riverton, Wyoming, and operated for a time in 1914, was idle in 1915.

Summit County's production was $644,000 in gold, 60,000 ounces of silver, 1,760,000 pounds of lead, and 9,000,000 pounds of zinc, as compared with $668,610 in gold, 67,009 ounces of silver, 1,565,231 pounds of lead and 5,111,941 pounds of zinc—a small decrease for gold and silver, a small increase for lead, but a very large increase for zinc. The four dredges at Breckenridge produced about the same yield of gold as in 1914, and the zinc shipments from Breckenridge increased heavily. Some lead and zinc shipments were also made from Kokomo and Montezuma.

Eagle County produced $98,000 in gold, 172,000 ounces of silver, 1,232,000 pounds of lead, 60,000 pounds of copper, and 10,500,000 pounds of zinc, as against $51,245 in gold, 127,080 ounces of silver, 1,177,385 pounds of lead, 28,105 pounds of copper, and 7,522,098 pounds of zinc in 1914, an increase for all metals, particularly for zinc. All the ore came from Red Cliff, the Brush Creek district being idle.

Park County's placer output decreased, but the yield of the lode mines increased appreciably, the total yield being $153,000 in gold, 8,500 ounces of silver, 177,000 pounds of lead, and 11,000 pounds of copper—the most important item of interest being an increase of $85,000 in gold, due mainly to activity at the London mine, at the head of Mosquito Creek.

Custer County produced $4,300 in gold, 32,000 ounces of silver, 86,000 pounds of lead, 17,000 pounds of copper—an appreciable increase for all metals. Fremont County continued to yield an appreciable quantity of copper and heavily increased its zinc yield. Garfield County made an increased yield of gold. Operations at the Bonanza Mine, Summitville, Rio Grande County, resulted in an appreciable production of gold. Saguache County mines were not as active as in 1914.

Charles S. Keith, of Kansas City, Mo., director of the American Mining Congress, was in Washington to attend the meeting of the Mining and Metallurgical Society and other meetings during last month.

IDAHO'S METAL MINE YIELD INCREASES FIFTY THREE PER CENT IN 1915

Principal Gain Is Made in Copper, Lead, and Zinc—Over $500,000 in Gold Recovered from Dredging—Gold and Silver Output Almost Unchanged During Year Just Closed

The United States Geological Survey reports that the output of gold, silver, copper, lead, and zinc from ores sold or treated from Idaho mines in 1915 had a total value of about $37,780,000. This is an increase of more than 53 per cent over the production of 1914, which was valued at $24,645,848. There was no great change in the output of gold and a slight increase in that of silver, but there were material increases in the production of copper, lead, and zinc, especially of zinc. The increase in the total value of these metals, amounting to over $13,000,000, was due largely to the increased price of lead and zinc. These estimates are reported by C. N. Gerry, statistician, at the Salt Lake City office of the Survey.

The mine production of gold was nearly the same as that of 1914, valued at $1,152,315. The yield of gold from dredging was over a half million dollars, but no more than during 1914. The Boston Idaho, in Boise County, and the Idaho Power Co., in Clearwater County, were the main contributors. The American Placer Mining Co. merely tested the machinery of their new plant at Pierce. There was an increase in gold yield from copper ore, particularly from the Empire Copper mine at Mackay, which had a record production of ore. Deposits of gold bullion at the Government assay office were greater than in 1914. In Elmore County, the Atlanta mines and the old Bagdad Chase property, now operated by the Boise Rochester Mining Co., produced bullion. In Owyhee County the Silver City M. & M. Co was operating a 10-stamp mill.

INCREASE IN SILVER

The production of silver from Idaho mines increased from 12,479,516 ounces in 1914 to about 13,000,000 ounces in 1915, or more than 4 per cent. The price of silver, however, was comparatively low and the value of the output was over $400,000 less than in 1914. The shipments of silver-lead ore and concentrates, which contained the greater part of the silver, decreased in the early part of the year, but increased considerably toward the end of the year, when the price of lead was over 5 cents a pound and that of silver was 56 cents an ounce. A considerable part of these increased shipments will not reach the smelters until 1916. The Hercules mine, which produces much silver, was idle for three months during the year on account of a controversy with the smelting company. The largest increase in silver output came from the Caledonia mine. Other properties which increased their production of silver were the Federal, Bunker Hill, Hecla, Gold Hunter, Tamarack and Custer, and Ontario, all in Shoshone County. The lead mines at Gilmore and the copper property at Mackay increased their output of silver.

The output of copper from Idaho was increased from 6,445,187 pounds in 1914 to about 7,169,000 pounds in 1915. As the Snow Storm mine at Larson is no longer a large producer, and as the Lost Packer mine, at Ivers, shipped only a few cars of matte, the increase was due almost entirely to unusually large shipments from the Empire Copper Co., at Mackay, in Custer County, which, in the middle of the summer, was shipping at the rate of about 9,000 tons a month. The National Copper Co. did not mill any ore, but a large amount of copper ore was said to be developed in the Horst-Powell property on the Little North Fork, north of Kellogg.

LEAD PRINCIPAL MINERAL

The mine output of lead, which is the main mineral product of Idaho, increased from 348,526,069 pounds in 1914 to about 377,000,000 pounds in 1915. A large part of this output, however, had not reached the smelters at the close of the year. This is an increase of over 8 per cent in quantity and nearly $4,000,000 in value. Nearly all the large mines of the Coeur d'Alene region produced more lead in 1915 than in 1914 on account of the effort to market the ore the last half of 1915. This was true also of the Wilbert Mining Co., in Fremont County, and the Pittsburgh-Idaho and Latest Out properties at Gilmore, in Lemhi County. The Idaho Continental mine, in Boundary County, formerly Bonner County, was sending lead product to Porthill by tractors when work was interrupted by the burning of the mill on July 30. A new mill was being constructed at the H. E. M. property northwest of Wallace. At the Marsh mine and mill improvements were made which have already increased the output. The smelting plant at Northport, Washington, was acquired during the year by some of the operators of Wallace, Idaho, and it is rumored that the ores of the Tamarack and Custer and the Hercules may be treated at this plant. Another item of great interest to the operators of the district is the fact that the Bunker Hill

and Sullivan Company has determined to enter the smelting business and may erect a plant near Wardner. The Yreka district, around Wardner, alone produced 169,500,000 pounds of lead against 162,471,235 pounds in 1914.

Shipments of zinc ore and concentrate from Idaho mines increased from 54,754 tons in 1914 to about 97,000 tons in 1915. The shipments contained about 80,000,000 pounds of recoverable spelter, valued at over $11,000,000. On account of the unusual price for zinc in 1914, the zinc produced in the State was more valuable than the gold, silver, and copper combined. The increase in recoverable spelter, which amounted to over 90 per cent in quantity, came principally from the Consolidated Interstate Callahan, Success, Morning, Greenhill, Cleveland, and Hercules. Other shipments were made around Murray, from the Terrible Edith, Paragon, Monarch, and Bear Top and Oro Fino; in the western part of the district, from the Highland Surprise and Constitution; and in Blaine County, from the Minnie Moore, Nay Aug, and United Lead and Zinc. A new deposit of zinc, from which a shipment of oxidized ore was made in December, was opened on the Deer Ridge property, in the Black Pine district of Cassia County. The output of zinc and the unusual payment of dividends by the Interstate Callahan mine, situated north of Wallace, were notable in 1915. During the third quarter of the year this property shipped 15,000 tons of ore and concentrate, principally zinc product, containing over 1,000,000 pounds of lead and 13,500,000 pounds of gross zinc. For the fourth quarter the rate was increased about 50 per cent. The tramway was completed from the mill to Sunset and the mill was considerably enlarged. The Success mine increased its output of both zinc and lead concentrates. The Frisco mill produced a large quantity of zinc concentrates. At Pine Creek considerable zinc ore was opened up and shipments will also be made from the Little Pittsburg property, as well as the Constitution. The Ray Jefferson, which lies west of the Interstate Callahan property, in the Beaver district, is reported to show a considerable deposit of lead-zinc ore.

The principal dividend payers in 1915 were the Consolidated Interstate Callahan, Hercules, Bunker Hill and Sullivan, Caledonia, Federal, Hecla, Stewart, and Success, which will pay in all nearly $9,000,000.

TEXAS INCREASES OUTPUT OF ITS METAL MINES

The output of Texas mines for eleven months of 1915, with an estimate for December, from preliminary figures reported by Charles W. Henderson, of the United States Geological Survey, amounted to $2,500 in gold, 705,000 ounces of silver, 250,000 pounds of lead, 50,000 pounds of copper, and 33,000 pounds of zinc, as compared with $234 in gold, 530,817 ounces of silver, 149,027 pounds of lead, 23,760 pounds of copper, and 216,451 pounds of zinc in 1914. The greater part of the output of silver came from the Presidio silver mine and cyanidation mill, in the Shafter district, Presidio County. Some silver and copper were produced at Van Horn, Culberson County, and some lead and zinc in the Sierra Blanca District, El Paso County.

WAR RESPONSIBLE FOR MOST U. S. ANTIMONY PRODUCTION

Antimony ores are found in commercially valuable quantities in this country in the States of Arkansas, Nevada, California, Montana, Idaho, Washington, and Oregon. Of these States the most important as producers of antimony ores are Nevada and California. Antimony ores are also found in a number of places in Alaska. The quantities of ore are large, but most of them are distant from transportation lines. Wages are high. The price of antimony generally has been low. The deposits are irregular and spotted so that what might be termed large deposits in other countries might not be considered so in this country.

No antimony has been produced in this country for a number of years except that which is contained in antimonial lead and a very few tons produced as a by-product in the electrolytic refining of lead and copper. Antimony is imported mainly from England and China. Small quantities also probably come from France, Japan, Hungary, and possibly one or two other countries.

During the present year many antimony deposits are being worked and a considerable production is being made owing to the very high prices which have prevailed during the whole year.

Antimony is being smelted in the United States by the Chapman Smelting Company, San Francisco, Cal., and the Merchants' Finance Co., at Industrial Harbor (a part of Los Angeles near San Pedro Harbor), Cal. Smaller quantities of domestic antimony ores are smelted in connection with lead ores by the Hoyt Metal Co., St. Louis, Mo., and the Pennsylvania Smelting Co., Pittsburgh, Pa., in the making of antimonial lead. Neither of the companies are, however, regularly in the market.

The smelting of antimony ores is described in the following works:

Handbook of Metallurgy, by Schnabel, Carl, translated by Henry Louis, volume 2, 1907, published by Macmillan Co., New York and London, pages 551 to 597.

The Metallurgy of the non-ferrous metals, by William Gowland, published by Charles Griffin Co., London, 1914, pages 438 to 456.

Antimony, its history, chemistry, mineralogy, geology, metallurgy, uses, preparations, analyses, production and valuation, with complete bibliographies, by Chung Yu Wang. London and Philadelphia, 1909, 217 pages; published by Charles Griffin Co., London.

UTAH'S METAL OUTPUT REACHES $55,000,000 DURING YEAR JUST CLOSED

One-fourth More Ore Mined than Last Year—Increase in Value of Products is $18,000,000—Bingham Alone Produces 8,000,000 Tons More than in 1914

Mines in Utah produced gold, silver, copper, lead, and zinc in 1915 amounting in value to $55,000,000, as estimated by V. C. Heikes, of the United States Geological Survey. This represents an increase over the production in 1914 of nearly 50 per cent, or $18,000,000. There was a considerable increase in all the metals. About one-fourth more ore was mined, increasing the total from 8,544,014 tons in 1914 to about 10,725,000 tons in 1915. About 9,900,000 tons were produced at Bingham, an increase from 7,800,661 tons in 1914. The bulk of this ore was mined at the Utah and Ohio Copper properties, which yielded about 9,000,000 tons of low-grade ore in 1915. Other mines that contributed large quantities of ore were the Utah Consolidated, Utah Apex, United States, Bingham, Bingham New Haven, and Utah Metal mines. The Tintic district produced about 290,000 tons, against 298,486 tons in 1914. The main ore producers were the Chief Consolidated, Iron Blossom, Centennial-Eureka, Eagle and Blue Bell, Mammoth, Gemini, Grand Central, and May Day mines. The 100-ton concentration mill, built primarily to treat Chief Consolidated ores, did considerable custom work.

In the Park City region about 99,795 tons of crude ore and concentrates were shipped, against 66,736 tons in 1914. Improvements in concentration methods resulted in large shipments of lead and zinc concentrate from the Daly Judge, Daly West, and Silver King Coalition mills. Two large concentration mills were built for treating tailings on the flats below Park City. Flotation was adopted at several mills in the region, and the prospect is that all the mills will be similarly equipped in 1916. In Beaver County the ore shipments, including a considerable quantity of old slag, amounted to about 38,000 tons, against shipments of 32,695 tons in 1914, principally from the Horn Silver and Majestic mines. In Tooele County the ore production, principally from Stockton and Ophir, increased from 58,871 tons to 65,374 tons in 1915. There were 26,077 tons of ore hauled from the Cottonwood districts to the smelters in 1915. The largest producer was the Cardiff mine, which yields rich lead-silver ore. Important shipments of silver ore were made from the South Hecla and the Michigan-Utah properties. Zinc ore was shipped from the Carbonate mine.

GOLD FROM BULL VALLEY

The mine output of gold increased over 19 per cent—from $3,265,347 in 1914 to $3,908,000 in 1915. Copper ores yielded the larger part of the gold, but large quantities also came from lead ore and siliceous ore. A comparatively small quantity of copper ore was produced in gold and silver mills. High-grade gold ore was mined in the Bull Valley district of Washington County during part of the year, and in the last half of the year new developments in the Fortuna district of Beaver County attracted attention, and wide veins of low-grade gold ore are said to be systematically exploited. At the same time small high-grade veins of gold ore are being mined and milled by lessees.

The mine production of silver increased from 11,154,916 ounces in 1914 to approximately 12,724,000 ounces in 1915, the increase amounting to 14 per cent in quantity and about $169,000 in value. Much of the silver is derived from lead ore, and smaller quantities from the copper and siliceous ores. Early in the year the Knight-Christensen chloridizing, roasting, and leaching mill was destroyed by fire, and during the summer was being reconstructed at Silver City by the Tintic Milling Co., which dismantled a similar plant at Park City that was recently used to treat Ontario ores. The new plant will probably be in operation early in 1916.

The copper output from Utah mines increased from 152,034,002 pounds in 1914 to about 182,589,000 pounds in 1915, the increase amounting to more than 20 per cent in quantity and about $11,450,000 in value. The gain was made mostly by the Utah Copper mine at Bingham, which is credited with an increase of 34,207,552 pounds over the output of 1914. Low-grade porphyry ore was produced from the Utah Copper property and a smaller quantity from the Ohio Copper mine. The Cactus mine, in southern Utah, was not operated, but preparations were being made by a leasing company using the flotation process to retreat the Cactus tailings, which are reported to carry 14 pounds of copper per ton. The Ohio Copper mine and mill, after going into the hands of a receiver, were for a long time idle, but during the last half of the year were being operated by lessees.

LEAD INCREASED 28 PER CENT

The mine production of lead increased from 171,323,137 pounds in 1914 to 219,098,000 pounds in 1915, or about 28 per cent, mostly from the Bingham district, where the Utah Apex, Utah Consolidated, United States, and Bingham New Haven were the largest producers. In Park City the Silver King Coalition, Daly West, Daly Judge, and Silver King Consoli-

dated added to the total output. In the Cottonwoods the mines produced over 12,000,000 pounds of lead, a large part of it coming from the Cardiff property.

With the advance in prices, zinc ore was offered from many sources. The mine production of zinc recoverable as spelter aggregated 22,643,000 pounds, valued at about $3,224,000. This is an increase of about 41 per cent in quantity over the output of 1914, amounting to 15,989,267 pounds. The largest shipments of zinc concentrates were made from the Midvale mill of the United States Mining Company, which treated some custom ore besides that handled from its own property at Bingham. The Daly Judge mine, at Park City, was the next largest producer of concentrates, followed by the Daly West and the mills recovering zinc from the old tailings lodged on the flats below Park City. Promontory district, in Box Elder County, became prominent in zinc production from the Lake View mine, which is credited with 3,446,916 pounds of zinc figured as recoverable spelter. New zinc deposits were also opened near Hyrum in Cache County and Woodside in Emery County, each district producing several cars of crude zinc ore. Altogether there were 38 producers of zinc ore in Utah in 1915.

All the smelting establishments were operating at full capacity soon after the first of the year. These were the Murray, Midvale, International, and Garfield plants.

Dividends amounting to about $9,000,000 were distributed by Utah mining companies in 1915, as against $7,431,017 in 1914.

ARIZONA CHAPTER REELECTS ITS OFFICERS AND DIRECTORS

Four hundred and seventy-one members are enrolled on the books of the Arizona Chapter of the American Mining Congress. This and many other interesting facts were brought out at the annual meeting of the Arizona Chapter, which was held in Phoenix, December 6.

With the exception of two new directors, which were added, all the old officers and directors were re-elected. The complete list of the officers and directors of the Arizona Chapters is as follows:

W. B. Twitchell, governor, Phoenix; E. M. Murphy, first vice-governor, Prescott; C. A. Grimes, second vice-governor, Pasadena, Cal.; and W. B. Gohring, third vice-governor, Warren.

Directors were elected as follows: J. P. Hodgson, Bisbee; Norman Carmichael, Clifton; A. J. Pickrell, Prescott; T. A. Riordan, Flagstaff; O. D. M. Gaddis, Kingman; W. H. Clark, Holbrook; L. S. Cates, Ray; B. Britton Gottsberger, Miami; Pat Rose, Globe; Wm. McDermott, Tucson; Con O'Keefe, Nogales; J. C. Goodwin, Tempe; Andrew Kimball, Thatcher; and D. A. Burke, Bouse.

W. B. Twitchell presided at the meeting.

Besides the directors present there were 108 members present either in person or by proxy.

Mr. Twitchell gave a brief history of the organization of the Chapter, and also stated what had been accomplished in the past year.

The report of J. H. Robinson, the secretary, was read. It showed 471 members enrolled, and a cash balance of $281.75 on hand December 1. The data gathered through the efforts of the secretary was the source of favorable comment.

On motion of Mr. Willis, which was carried unanimously, the membership fee was reduced from $5 to $3 per annum. Of the amount so collected $2 is to be sent to the American Mining Congress for association membership and for the MINING CONGRESS JOURNAL, and $1 is to be retained by the chapter for membership dues.

Mr. Willis, together with Mr. Twitchell, were selected as a committee to draft resolutions of thanks to Patrick Rose for the interest he has taken in the chapter in securing memberships and promoting the mining industry in this section.

Mr. Twitchell was selected unanimously as a delegate to the Mining and Metallurgical Society meeting in Washington.

Papers by President Andrew Kimball, Professor Willis, director of the School of Mines of the State University at Tucson, and C. S. Scott, of the *Arizona Magazine*, were read.

After adjournment the board of directors met and selected B. Britton Gottsberger, of Miami; J. P. Hodgson, of Bisbee, and W. B. Gohring, of Warren, as the executive committee, and H. J. McClung, of Phoenix, as treasurer. J. S. Douglas, of Douglas; S. W. French, of Douglas; W. B. Gohring, and Norman Carmichael, of Clifton, and Mr. Will L. Clark, of Jerome, were elected to compose the finance committee for the ensuing year.

The Executive Committee elected J. H. Robinson, of Prescott, secretary for the ensuing year.

Prescott was selected as the headquarters of the chapter.

METALLURGY OF TUNGSTEN ORES TREATED IN GERMAN WORKS

The U. S. Geological Survey has issued no literature bearing upon the reduction of tungsten ores. The work of the Survey is confined almost wholly to the geology of mineral deposits so that such information as it has upon the reduction of ores is largely incidental.

The metallurgy of tungsten ores is treated in the following works:

Die Metallurgie des Wolframs mit besonderer Berücksichtigung der Elektrometallurgie sowie der Verbindungen und Legierungen des Wolframs samt seinen Verwendungen, Praktisches Handbuch von Dr. Hans Monnicke, Ing.—Chemiker, Berlin W., Verlag von M. Kryan, 1911.

Wolfram, Eine Monographie mit einem Anhang Die Patentansprüche über Wolfram-Glühkörper von Dr. Phil. Heinrich Leiser, Halle a. S., Verlag von Wilhelm Knapp, 1910.

SECRETARY OF LABOR REVIEWS WORK OF DEPARTMENT

Taking the past achievements of the Department of Labor as a criterion, Secretary William B. Wilson, head of that branch of the Government, declares in his annual report that the hopes of the sponsors for the infant department are in a large measure possible of fulfillment.

Reviewing the steps leading to the establishment of the governmental branch, and outlining the purposes of the department, Secretary Wilson says that up until July 1 last "the good offices of the department have been invoked and amicable adjustments effected in some seventy trades disputes, affecting directly or indirectly some 200,000 men and millions of dollars' worth of property. The amount of hardship and suffering and the property losses which have been averted are incalculable.

"An instance will convey an idea of the proportions which some of these controversies assume and the results which are frequently achieved through the intervention of the department. In April, 1914, the department was requested to intercede in an effort to find a basis of agreement in connection with a controversy which had arisen between the Great Lakes Towing Company and the Licensed Tugmen's Protective Association, and which threatened to result in the tying up of commerce in nearly every part of the great lakes.

"A representative was accordingly dispatched to the scene of the dispute and succeeded in bringing about an understanding between the interested parties. It is estimated that if the strike had been prolonged throughout a period of five weeks it would have entailed a direct property loss of some $3,000,000 and thrown out of employment more than 8,000 workmen. Through the department's efforts, however, it was brought to a termination after having run little more than one week."

Discussing the work of the division of information, the duties of which are to promote a beneficial distribution of admitted aliens and others by collecting and disseminating among them trustworthy data concerning opportunities for employment or settlement, he said:

"The department was prompt to recognize the possibilities which this statutory authority held out for the advancement of the wage-earners' opportunities for profitable employment, and immediately set about to perfect a nation-wide system of intelligence offices for the collection and dissemination of information as to where labor of all kinds was in demand. The farmers of the country quickly availed themselves of the department's services.

"The first large undertaking of this nature occurred in May, 1914, when requests began to pour into the department from the officials and farmers of Oklahoma, Kansas, Missouri and South Dakota for assistance in their efforts to procure harvest hands. Through cooperation with the postoffice authorities the department was enabled to give the widest publicity to the needs of these States, with the result that within a comparatively short time approximately 75,000 men were directed to employment; and the farmers were enabled to gather their wheat crop in due season.

"Hand in hand with the movements for the betterment of conditions of the wage-earners in the country has been the effort to improve the welfare of our children. The same spirit of enlightenment which resulted in the creation of the Department of Labor was responsible for the establishment of a federal children's bureau, which is inquiring into the causes of infant mortality, as well as other conditions surrounding and affecting the lives of our children. It endeavors, through its teachings, based upon facts disclosed by exhaustive investigations, to develop children into healthful, intelligent and useful citizens. In the field of child labor the bureau is rendering valuable service, and it is anticipated that its efforts in this direction will be effective in reducing or eliminating the evils which have crept into our complex system of industry and which have operated to deprive so many of our children of the opportunities for education and the development of sound and healthy bodies.

"The Bureau of Labor Statistics in engaged in the compilation of authoritative information concerning labor in the most comprehensive sense of that word, and especially with regard to its relations to capital, the hours of labor, the earnings of laboring men and women, and the means of promoting their mental, social, intellectual and moral prosperity.

"At the various immigration stations throughout the country which come under the jurisdiction of the Bureau of Immigration, much has been done in the way of humanizing the facilities for the reception of aliens. Female employes have been designated to exercise a careful supervision over unaccompanied women and girls and to guard them from the perils which constantly beset the unsophisticated women who arrive at our gates. At Ellis Island, through which the largest number of our immigrants come, notable results have been achieved. In its administration of the immigration laws, which bring before it all the ills and woes peculiar to the human race, the physical, moral and mental welfare of the immigrant is ever uppermost in the department's mind."

MAINE HAS TIN VEIN, BUT IT IS TOO LEAN TO BE WORKED

Tin has been found at Winslow, Me., in a small vein of no economic value. Occasional pieces of cassiterite have been found in the pegmatites at Mount Mica and Mount Tourmaline, but probably the entire quantity uncovered would not amount to more than a few pounds. The tin vein at Winslow is described by T. Sterry Hunt, under the title "Remarks on an occurrence of tin ore at Winslow, Maine," in the Transactions of the American Institute of Mining Engineers, volume 1, 1873, pages 373 to 375.

MINERAL PRODUCTION IN ALASKA BREAKS ALL PREVIOUS RECORDS OF TERRITORY

While High Price of Copper was Principal Cause for Increase in Output of Northern Mines Much Development Work was Done During Last Twelve Months

The Alaska mining industry, as a whole, was more prosperous in 1915 than in any previous year. This is indicated by the value of the total mineral output, which is estimated to have been $32,000,000, compared with $19,064,963 for 1914. The highest value for any previous year was in 1906, when Alaska produced $23,378,428 worth of minerals, but this was at a time when the bonanza placers of Fairbanks and Nome were yielding their greatest returns.

The high value of the mineral output in 1915 was due in large measure to the extraordinary amount of copper that was mined. Preliminary estimates indicate this to be 83,850,000 pounds, valued at $14,400,000. In 1914 21,450,628 pounds of copper were mined, valued at $2,852,934. The gold production also increased in 1915, when the value was about $16,900,000, against $15,626,813 for the output of 1914. This is the largest gold production since 1912, when the output was valued at $17,145,951. As the production of silver is incidental to gold and copper mining, this also increased. It is estimated that $400,000 worth of silver was mined in 1915, against $218,327 worth in 1914.

The output of other minerals, including tin, antimony, marble, gypsum, coal and petroleum, in 1915 had a value of about $300,000, compared with $222,802 in 1914.

In addition to the productive mining a large amount of dead work was accomplished during 1915 on properties that made no output. Therefore the abnormally large value of the total mineral production must not be considered as simply a temporary expansion of the mining industry, due to the high price of copper. The developments made during the year give assurance of continued large operations in both copper and gold lode mining. Placer mining has been less prosperous, for this industry has not yet reacted to the stimulus of the Government railway, which will make available for profitable exploitation large bodies of low-grade gravels. The same is true of the coal-mining industry, which also must await railway transportation.

The first gold mining in Alaska was done in 1880, and since that time gold to the value of about $261,050,000 has been produced. Of this about $186,200,000 has been won from the gold placers. Copper mining began in 1901, and the total copper output of Alaska is now about 217,250,000 pounds, valued at $34,150,000. The value of the total silver production to date is about $2,650,000. Coal, petroleum, tin, lead, quicksilver, antimony, marble, gypsum, and other minerals have been produced to the value of about $2,150,000. Therefore, the value of the total mineral production during thirty-six years of mining in Alaska has been $300,000,000.

GOLD PLACER MINING

The data in hand indicate that the value of placer gold produced in 1915 was $10,500,000, compared with $10,730,000 in 1914. This decrease of output, if borne out by the final figures, is chargable to the falling off in the output of some of the Yukon camps. On the other hand, the developments in the Tolovana district, where gold was discovered in the autumn of 1914, indicate that this will become of some importance as a producer.

About forty-two gold dredges were operated in Alaska during 1915, the same number as in 1914. From the information at hand it appears, however, that the value of the gold recovered by dredges was less than $2,000,000 in 1915, compared with $2,350,000 in 1914. This falling off is chargeable to the Seward Peninsula districts, where about thirty-seven of the dredges are located. There can be no question that this decrease of dredge output is but a temporary check to the industry as a whole, and is due to certain local conditions. Several dredges that will be operated in 1916 are in process of installation.

GOLD-LODE MINING

About twenty-three gold-lode mines were operated on a productive basis in 1915, compared with twenty-eight in 1914. On the other hand, the value of the gold-lode output has increased from $4,863,028 in 1914 to about $6,200,000 in 1915. This increase is to be credited to the Juneau district, where large developments were continued throughout the year. There can be no question that the gold-lode output will increase at a rapid rate. This will be due not only to large-scale operations in southeastern Alaska, but also to the encouragement given to lode mining by the railway under construction from Seward to Fairbanks.

COPPER MINING

The tremendous increase in copper output during 1915 has already been noted. Nearly four times as much copper was produced as in the previous year, and the value was nearly five times as much. The copper was taken from fourteen mines, of which seven were in

the Ketchikan district, four on Prince William Sound, and three in the Chitina district.

Though the high price of copper led to the reopening of some of the smaller mines in the coast region, yet it should be noted that the increased output was possible only because of the large developments that have been under way for several years. The advance of the Alaska copper-mining industry during the year may therefore be said to have been a normal development of the industry. It is, of course, true, however, that if it had not been for the high price of the metal, the output would have been considerably less. It augurs well for the future of the industry that the Alaska copper mines are now sufficiently developed to produce so large a tonnage.

TIN MINING

It is estimated that about two hundred tons of stream tin were produced in Alaska during 1915. Much the larger part of the tin came from the York district of Seward Peninsula. Here one tin dredge was operated throughout the season on Buck Creek. A new dredge was installed on the same creek during the summer and operated for a part of the season. No returns have yet been received from the two dredges operated in 1914 on Anikovik River, in the same district, but these were probably also operated. These two are working on placers carrying both tin and gold. Developments were continued on the Lost River lode-tin mine, and there was also some prospecting of other lode-tin deposits. There was, however, no production of lode tin.

The only other tin mining in Alaska during 1915 was done in the Hot Springs district of the lower Tanana Basin. Here considerable tin is recovered incidental to gold placer mining.

ANTIMONY

The high price of antimony in 1915 led to the mining of over eight hundred tons of stibnite ores in Alaska. Nearly seven hundred tons of this output came from the Fairbanks district, and the rest from Seward Peninsula. It is difficult to obtain any exact valuation of the stibnite ore shipped from Alaska. The evidence in hand indicates that the producer received from $1.25 to $1.75 per unit of stibnite. It is probably reasonable to estimate that the Alaska shipments sold for $86 a ton in San Francisco. This indicates a value of about $70,000 for the total shipments made in 1915.

Four antimony properties were operated in the Fairbanks district during 1915—the Scrafford, in the Treasure Creek Basin; the Stibnite, in the Eva Creek Basin; the Gilmer, in the Vault Creek Basin; and the Chatham Creek mine. All the operations were on a small scale. The mining consisted chiefly of making open cuts and digging out the ore, which occurs in shoots, kidneys, and irregular masses along zones of fissuring. Most of the ore was broken and hand-sorted, and no ore carrying less than 50 per cent of antimony was shipped. The average antimony content of the ore was probably 58 per cent. Considerable prospecting was also done on a number of other stibnite lodes in the Fairbanks district.

The ore was hauled to the railway by wagons and then sent by rail to Fairbanks and over the all-water route to San Francisco. The transportation companies offered a low freight rate to encourage the new industry.

Developments were continued on the Sliscovitch mine, in the Nome district. The ore from this property carries some gold, and the mine has been worked for gold. In 1915, however, the energies of the operators were directed toward getting out stibnite ore. Some stibnite was also mined at the Hed & Strand property, a few miles north of the Sliscovitch mine. The total ore shipped from Nome is reported to be 132 tons, but there is reason to believe that a considerably greater quantity was mined.

Stibnite is not an uncommon mineral in Alaska. The recent demand for antimony has led to the prospecting of a number of stibnite deposits within the Territory. Such work is reported in the Kantishna district, on Prince William Sound, and on Kenai Peninsula.

MINERAL FUELS

One coal mine was operated on Cook Inlet in 1915 to furnish lignitic coal to a local market. There was also a little mining at several other localities. Some investigations were made in the Matanuska and other Alaska coal fields by those who are contemplating making applications for leases. Meanwhile the General Land Office has made the subdivision surveys of the more accessible parts of the Bering River, Matanuska, and Nenana coal fields.

There were no important developments in the oil fields. Some oil was produced in the Katalla field. Oil seepages were found near Wainwright Inlet, in the extreme northwestern part of Alaska. This locality is probably a western extension of the oil belt indicated by a seepage previously known, near Smith Bay, on the north Arctic coast of Alaska.

VANADIUM BEING MINED IN COLORADO ONLY

The only deposit of vanadium ores now being mined in this country so far as is known to the Geological Survey is owned by the Primos Chemical Co., and is located at Vanadium, San Miguel County, Colo. All of the carnotite mines are, however, producers of vanadium-bearing minerals. The ore is all sold to manufacturers of radium and could not be sold for the vanadium alone. It is therefore only necessary to have the names of the radium manufacturers to get the names of the producers of vanadium from this source

The Standard Chemical Co., Pittsburgh, Pa.; the National Radium Institute, Denver, Colo., and Dr. W. A. Schlesinger, Radium Refining Laboratories, Princeton, N. J., are such producers.

Traffic Developments of the Month

BAUXITE ORE

From the facts of record we conclude and find that the respondents have justified the proposed rates on bauxite to East St. Louis and to other points to which the same rate is named in the suspended schedules and also the proposed rate to Memphis, but we further conclude and find from the facts of record that the other rates proposed have not been justified. These findings, however, are without prejudice to or approval of the readjustment of rates to eastern points which it was announced at the hearing would be made.

Bauxite is produced in only four States in this country. More than 75 per cent of that production is in Arkansas, the other three States in which bauxite is produced being Georgia, Alabama, and Tennessee. Georgia ranks second in production, and Georgia and Alabama produce jointly from 12 to 18 per cent of the total production in the United States, the proportion varying from year to year. The total production has been gradually increasing. The production in 1914 was 219,318 gross tons, as compared with 52,167 gross tons in 1908. The Arkansas mines are practically within a circle not over thirty miles in diameter, and are near Little Rock. The protestants of record are the Aluminum Company of America, hereinafter called the aluminum company; Aluminum Ore Co.; American Bauxite Co.; the Republic Mining and Manufacturing Co.; the Globe Bauxite Co.; the Laclede-Christy Clay Products Co.; the Norton Co.; Superior Chemical Co.; and Water Softening & Purification Works, of Columbus, Ohio.

The Aluminum Ore Co. and the American Bauxite Co. are subsidiary companies of the aluminum company, and the Republic Mining and Manufacturing Co. is closely affiliated with that company.

Bauxite is also produced in various countries other than the United States, but principally in France, India, and South America. The bauxite produced in this country has thus far come in serious competition only with that from France. The imports of bauxite have fluctuated greatly. In 1911, 43,222 tons were imported; in 1912, 26,214 tons; in 1913, 21,456 tons; and in 1914, 24,844 tons. The protestants claim that the European war greatly cut down the importation in 1914.

While bauxite is usually called an ore, it has no specific listing either as an ore or a clay, but it has the appearance of clay. From bauxite is made the metal aluminum, sulphate of alumina, commonly called alum, fire brick, and alundum, which is used to make grinding wheels similar to emery wheels.

A carload of bauxite consists largely of lumps of various sizes, but some of the ore becomes finely powdered in handling. Box cars are required for the traffic, but cars of a high grade are not ordinarily used. The minimum weight is the marked capacity of the car, but in no event less than 40,000 pounds, and the average loading is shown to be 73,696 pounds, cars being usually loaded 9 per cent in excess of marked capacity.

It is claimed by the respondents that bauxite does great damage to the cars in which it is shipped, for the reason, as they assert, that the powdered bauxite pushes out the sides and ends of the cars; but the protestants deny this and it is not established by the evidence.

Justifies Some Increases

In the matter of pig iron rates from Virginia furnaces the commission's findings are summed up as follows:

1. Proposed increased carload rates on pig iron from Virginia furnaces to certain points in Pennsylvania, New York, and Maryland not justified.
2. Proposed increased rates to Pittsburgh and Pittsburgh rate points justified.
3. Proposed increased rates to West Virginia points justified.
4. Proposed increased rail-and-water rate to Boston not justified.

S. E. Calkins, of the Geological Survey, has been sent to San Diego County, Calif., with instructions to look at the molybdenum deposits there.

Reparation on Manganese

Reparation has been granted by the Interstate Commerce Commission to the E. J. Lavino Company against the Pennsylvania Railroad. The refund covers overcharges on a shipment of fifty-one cars of manganese ore from Baltimore to Niagara Falls.

MINING LEGISLATION TO BE PUSHED AT THIS SEASON

Congress at this session will take up a more comprehensive program of legislation affecting mining than ever before has been the case. Martin T. Foster, chairman of the Mines and Mining Committee of the House of Representatives, declares that he will make unusual effort to expedite the prompt handling of the meritorious bills which may come before his important committee. Mr. Foster is greatly interested in seeing provision made for a thorough revision of mining laws at this session of Congress.

Mr. Foster has a personal bill which provides for placing in the hands of the Bureau of Mines all purchases of Government coal. These purchases are only to be made after careful study has been made of the coal best suited to the use for which it is required.

CALIFORNIA RETAINS TITLE AS PREMIER GOLD PRODUCING STATE OF THE UNION

Its Record in 1915 Exceeds That of Any Year Since 1865, with One Exception—Placer Mines Are Producing Forty-four Per Cent of the Gold Yield of the State—Copper, Lead and Zinc Show Big Increase

California mines show a materially increased output in gold, silver, copper, lead, and zinc in 1915, compared with 1914, according to preliminary figures compiled by Charles G. Yale, of the United States Geological Survey. The mine figures for 1914 were $20,653,496 in gold, and 1,471,859 fine ounces of silver; the estimates for 1915 indicate an output of $22,860,590 in gold, and 1,974,529 ounces of silver, an increased of $2,207,094 in gold and 502,670 fine ounces of silver. California remains the premier gold-producing State of the country. The yield for 1915 is the largest in thirty-two years and with one exception, the largest in fifty-one years. There are about seven hundred producing metal mines in the State, about evenly divided between deep and placer mines. About 2,500,000 tons of ore are mined and treated in the State annually of an average value in all metals of $6.75 per ton. In value of all metals produced, Shasta is the leading county, while in value of gold output, Nevada, Amador, Yuba, and Sacramento are the leading counties in the order named. .

Placer mining for gold, for years considered a decadent industry in California, has for the past eighteen years been growing in importance, until now the placer mines are produring 44 per cent of the total gold yield, the other 56 per cent coming from deep mines. This condition has been entirely brought about by the dredging operations, the gold-dredges now producing some 86 per cent of the placer gold. During 1915 there were sixty-seven gold dredges in California, of which six were closed down all or part of the time, and one was burned, leaving sixty active dredges. Of the idle dredges, one was being moved from Oroville to Shasta County; one from Oroville was rebuilt; and one in shasta County was removed to new ground in the vicinity. A new one was built in Calaveras County. A large 16-cubic-foot bucket dredge is under construction for the Yuba Consolidated Gold fields, in Yuba County; and another one of equal capacity (to dig 70 feet below water line) is being built for the Marysville Dredge Company in the same county. Plans have been prepared for still another of the same size for the Yukon Gold Company in the same dredge field. The present tendency is toward extensive yardage in dredging operations so the new machines are much larger and more powerful than those built formerly. It is considered probable that for this reason the yield of dredge-gold in California will continue about the same for some years, even though the old and smaller machines discontinue operations.

There has been a distinct revival in all kinds of metal mining in the State in 1915, particularly in gold mining. The dredge men have begun operations on tracts formerly considered too small for this class of work; and numerous quartz mines have been reopened, while the older ones have been deepened with good results.

The silver output from the mines shows an increase in 1915, as compared with 1914, of 502,670 ounces. This is mainly derived from the smelting of copper, lead and zinc ores, although some silver is recovered in the mining of both quartz and placer gold.

The estimated mine yield of copper in California in 1915 is 44,098,552 pounds, as compared with 30,507,692 pounds in 1914, an increase for 1915 of 13,590,860 pounds. The larger proportion of this was derived from Shasta County, as usual, although Calaveras and Plumas counties contributed a liberal quantity and other counties made some yield.

The mine output of lead in 1914 was 4,251,923 pounds; in 1915 it is estimated at 6,346,319 pounds, an increase for the latter year of 2,094,396 pounds. Most of this is derived from the Southern counties of the State, particularly Inyo County.

The estimated zinc output of the State in 1915 is 11,443,925 pounds, against 389,471 pounds in 1914, an increase for 1915 of 11,054,455 pounds. This is the largest production of this metal ever made in California in one year. The greater proportion was derived from Shasta County, where one of the large copper smelters has installed a zinc sorting plant. Inyo County was also a large contributor to the zinc output of the State.

Mining Congress members are requested to advise the Washington office of any change of address. Copies of the MINING CONGRESS JOURNAL are being returned for want of a proper address. This applies to some of the first-class mail addressed to members.

AMERICA'S INDUSTRIAL GREATNESS DUE TO ITS HUGE MINERAL PRODUCTION

The United States Produces Forty Per Cent of the World's Coal and sixty-Six Per Cent of its Petroleum—All History Shows That Mineral Resources Are the Source of Power

Great importance was attached by the delegates and other mining men present at the Pan-American scientific conference to the address of Dr. George Otis Smith, director of the Geological Survey. Some of the striking points he made are as follows:

Patent reasons for America's industrial greatness—The country produces 40 per cent of the coal of the world; 66 per cent of the petroleum; 40 per cent of the iron; 60 per cent of the copper, and 32 per cent of the lead and zinc.

Wise use becomes a duty when anything can be used but once.

The development of mineral resources is a national duty.

Mineral wealth is the foundation of power.

Mineral exports are winning for the United States a new and larger place in the world market.

Metal mining has passed from the exploitation of bonanzas to the working of low-grade deposits.

For 1915 the Federal corporation tax on copper mines alone may total $1,000,000.

The public's direct share of the proceeds from mineral resources must not be so great as to affect unfavorably labor's opportunity or capital's incentive.

Because of the essential relation between the mineral resources of a country and its prosperity, there rests on the public a continuing obligation to the mining industry.

Since 1906 the average recovery from United States copper ores has decreased from fifty pounds of metal per ton to thirty-two pounds. This change is due more to the improvement of methods than to the exhaustion of the richer deposits.

The day of large opportunity for exploration and investigation of the mineral resources of this country is not past.

Dr. Smith's address follows in its entirety:

A nation's mineral wealth may benefit its citizen body in two ways—as a source of direct revenue to the State and as a basis of industrial development. The task of placing the true social value upon mineral resources therefore involves the determining of the extent to which these two methods of serving the public interest are in harmony and, if they chance to be opposed, then the weighing of the alternative benefits.

Mineral wealth as an expendible resource rightfully commands the attention of the patriotic citizen, whether he be lawmaker or landowner, geologist or chemist, capitalist or mineworker. Wise use becomes a duty when anything can be used only once; and if full utilization means much to society, individual rights whose exercise involves anything less than full utilization must be subordinated to the public interest. In a democracy, therefore, the use of a mining property should serve the many, not the few. Thus, the development of mineral resources is of nation-wide value and the promotion of their best use properly becomes a national duty.

NATIONAL ASSET

A nation's store of mineral deposits is a national asset, whose value cannot easily be overestimated. In his recent report to the President, the Secretary of the Interior, in speaking of the assets of this country, gave the mineral resources first rank under the suggestive title, "the foundations of power." The higher the stage of civilization a nation may attain the more exact becomes this conception that mineral wealth is the foundation of power. It is not without striking significance that mineral names have been given to the steps in the evolution of society—the stone age, the copper age, the bronze age, the iron age, and finally the age of coal, in which we of this twentieth century live. And the dependence of society upon these mineral products is shown by the fact that never has the per capita consumption been greater, not only of coal, but also of iron and copper, and even of stone.

A nation that produces under normal conditions 40 per cent of the world's coal and 66 per cent of its petroleum, surely has its share of the two great fuels; add the fact that our mines, furnaces, and smelters yield 40 per cent of the world's iron, 60 per cent of its copper, and 32 per cent of its lead and zinc, and the reason is patent for America's industrial greatness.

OF STATEGIC VALUE

Independence through possession of the material resources essential to modern life is itself a promise of a nation's integrity, and the nation that makes the whole world its debtor through shipments of the mineral fuels and the metals and the mineral fertilizers, occupies a strategic position in the construction of international policy.

How best to realize upon this national asset is a problem in democratic government. Under Roman law and in part under early English law, as well as under most continental and Spanish-American systems, the ownership of mineral deposits was subject to certain rights of the sovereign.[1] This "regalian right" had a common origin with the broader and more modern theory stated by General Halleck in 1860, that mines "are by nature public property and that they are to be used and regulated in such a way as to conduce most to the general interest of society."[2]

APPRAISAL OF MINES

This regalian doctrine has been followed by only a few of our States, and indeed it can be said that practically all that remains of this old doctrine in our present mining system is the common term "royalty," now used mostly, however, for the tax on output paid to the private owner. As a source of direct governmental revenue mineral deposits have been treated much as other property, on the principle that taxation shall be equal. In the recent discussion of this practical civic problem there stand out a few generalizations that perhaps present the difficulties of the problem rather than its solution. An equitable valuation of undeveloped ore deposits is hardly to be expected, and either a high valuation or a high rate of taxation must tend to hasten the exhaustion of a mine, resulting in overproduction and in the early termination of opportunity for the mine-worker. At best, both theory and method in the appraisal of mining property involve the determination of the present worth of expected profits. After estimating probable tonnage of ore developed and prospective, forecasting reasonable future costs, and averaging fluctuating prices, as well as giving due consideration to the rate of mining as possibly affected by market and other conditions, the public officer charged with making an ad valorem appraisal completes his task by applying a factor of safety as evidence of good faith.

ELEMENT OF COST

Opposed to this method of appraisal based upon expected future returns is the system of taxing the actual present output. Aside from the greater certainty of this method, the tax on output possesses an added advantage in that it provides revenue for local governmental purposes at the time when the demands are heaviest and in an amount roughly proportioned to those demands. However, either a tax or a royalty that is based upon the gross value of the output falls short of the ideal by its lack of consideration of the important element of cost, which may vary less than the unit value of the output, with the result that the tax rate which is excessive for a $5 ore is actually far less burdensome on $50 ore, although the amount of this tax is ten times as large.

More equitable than even a graded tax upon gross output is one assessed upon net returns. All that the public can logically ask on account of the development of mineral resources is a share in the profits. If in the operation of a mine the margin between costs and returns is small or nothing, why should society exact its pound of flesh? On the other hand, the regular dividend-paying company can well afford to recognize the general public as a silent partner possessing a share in the profits of the business. Professor Seligman believes that "the main reason why the twentieth century has become the century of income taxes rather than of property taxes,"[3] is the feeling on the part of business men that yield or income is the more satisfactory index of fiscal obligation.

BIG INDUSTRIAL FACTOR

It is as the basis of a nation's industrial growth, however, that mineral resources loom largest. Both self-centered independence and world-wide participation in commerce must come through the fullest use of these basal materials. Consumption of the essential minerals does not place a nation in the spendthrift class, but is in fact a measure of its industrial efficiency. It has been pointed out that the greater per capita consumption of coal in the United States than in any other country proves that this nation is burning coal for other nations—it is the gratifying test of industrial capacity. By this measure, too, Mr. Finlay[4] contends that "the industrial output per man is greater in the United States than in any other country.

The development of the United States in industries other than agriculture is well illustrated in the story of the utilization of our mineral resources. Though such agricultural products as cotton and the cereals continue to bulk large in the trans-Atlantic trade, the mineral products form a constantly increasing

(Continued on page 44)

[1]Lindley on Mines, 1, p. 21.
[2]Quoted by Lindley, op. cit.
[3]Seligman, E. R. A., Am. Acad. Polit. and Social Sci. Annals, March, 1915, p. 8.
[4]Finlay, J. R., Min. and Met. Soc. America Bull., vol 8, p. 151, 1915.

WASHINGTON PRODUCES MORE COPPER AND LEAD

The value of the mine output of gold, silver, copper, lead, and zinc in Washington decreased from $809,767 in 1914 to approximately $728,000 in 1915, according to preliminary estimates by C. N. Gerry, of the United States Geological Survey. There were increases in copper and lead, to the extent of a return to normal production. There were shipments of zinc ore, the first since 1911. The gold and silver mines, however, showed decreased output, especially in the Republic mining district.

The mine production of gold, which is the most important metal of the State, decreased from $557,173 in 1914 to about $407,000 in 1915. The bulk of the gold came from ore shipped directly to smelters, as mills at Republic were idle. There were, however, gold mills operated in Chelan, Okanogan, and Whatcom counties. The Montana mine, in the Methow district, made a good production from a small mill, and the Molson, Poland China, and Duluth-Toroda mills were operated for a time.

SILVER OUTPUT DECREASES

The silver output of Washington mines decreased from 264,861 ounces in 1914 to about 220,000 ounces in 1915. This was also largely due to inactivity at Republic, where the mill bullion formerly produced contained considerable silver. Approximately 40 per cent of the silver came from the copper ores of Stevens County. A large portion had its source in silver ores shipped to various smelters from Republic.

The mine output of copper increased from 778,728 pounds in 1914 to about 915,000 pounds in 1915, or over 17 per cent. On account of the increased price of the metal, the value increased from $103,571 to about $159,000 in 1915. The production was not as great as the production of either 1913 or 1912. The greater part of the yield came from the Chewelah district, from which approximately 4,500 tons of crude ore and concentrates were shipped. Other low grade copper ores and iron ores containing some copper were shipped from Stevens and Ferry Counties.

The production of lead from ores sold or treated increased from 65,507 pounds in 1914 to about 230,000 pounds in 1915. The Bonanza mine at Bossburg was the main contributor. Small shipments were also made from the Nighthawk and Colville regions. Work was resumed at the Last Chance mine in the Northport district. The smelter at Northport was being remodeled to treat custom ore, but especially lead ore from Idaho.

ZINC FROM ONE DISTRICT

The zinc output was entirely from the Metaline district, Pend Oreille County, where the Lead-Zinc Company operated a 50-ton concentration mill the latter part of the year. Several hundred tons of sulphide concentrates were shipped. together with some carbonate ore. At the Oriole mine, in the same district, a similar mill was not operated.

At Chewelah in Stevens County the milling plant of the United Copper Company was being enlarged from twenty-four stamps with concentration tables, to fifty stamps with flotation machines. It is planned to work a large tonnage of tailings resulting from former mill operations. There was active development work in progress at other properties in the district on account of the price of copper, which reached nearly 20 cents per pound in June.

In the Republic district about 36,000 tons of crude ore, containing gold and silver, were shipped to smelters. In 1914 shipments consisted of 32,183 tons, but during that year ore was also milled. The important shippers were the Ben Hur, Knob Hill, San Poil, Surprise, Lone Pine, Pearl, Rathfon, Tom Thumb, and Trade Dollar. The Western Union Mines Company, which controlled the Surprise, Lone Pine, and Pearl properties in the early part of the year, failed and was followed by the West Virginia Mining Company, which also suffered financial difficulties. The San Poil mine and mill were in the hands of a receiver and fewer shipments were made. The North Washington mill was idle throughout the year. There was considerable activity at various properties in Okanogan County at Oroville and Nighthawk, and some shipments were made from the Sultan and Monte Cristo districts in Snohomish County.

In Demand by Schools

An increasing number of Survey publications are being used in school work throughout the country. Applications are being received almost daily from superintendents of schools and from officers of educational institutions who desire to make use of these publications in connection with studies along various lines.

"We think that the American Mining Congress deserves the general support of those engaged in mining. We need a parliament of mining operators and engineers to assemble periodically with a view to crystallizing opinion on matters of moment to the industry.

"The social obligations of good citizenship call upon the members of the profession and the bigger brotherhood of all those actually engaged in mining operations to unite in giving effective support to the American Mining Congress."—Extracts from an editorial in The Mining and Scientific Press of September 18.

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EDITORIALS

LAW FIFTEEN MONTHS OLD AND NO ALASKA LEASES

A committee of the House of Representatives of the United States, in order to take from the Alaskan coal claimant his last opportunity to protect his rights and defend his name and reputation, put this cunning section into the bill—(H. R., 14233, Sixty-third Congress, approved October 15, 1914): "Sec. 13. That the possession of any lessee of the land or coal deposits leased under this act for all purposes involving adverse claims to the leased property shall be deemed the possession of the United States, and for such purposes the lessee shall occupy the same relation to the property leased as if operated directly by the United States."

STILL LOCKED UP

This bill was enacted by Congress, and for fifteen months has been the law. No leases have yet been made, and the coal of Alaska, after thirty years of effort, is as effectually locked up today as at the beginning.

This Alaskan experience furnishes reasons why many citizens believe that the Government should dispose of all her public lands in limited areas to individual citizens at the earliest time possible, having due regard for other citizens who might desire to receive of the national bounty, excepting only such property as is needed for governmental purposes.

These argue that the direct management and supervision of mines and the agencies necessary to make governmental control effective will largely augment the functions of our Government and force it into comparative business competition with her own citizens.

THE OTHER SIDE

Many others, equally sincere, believe that the Government should retain ownership and control of those minerals which, being once exhausted, can never be reproduced and which are essential to our industrial progress. Just what the future control of the minerals on the public domain is to be probably will be decided by the present session of Congress.

This was one of the arguments presented by J. F. Callbreath, secretary of the American Mining Congress, in an address before the Pan-American Scientific Conference. He holds that this controversy is one of the most important internal questions ever presented for consideration to the people of the United States.

GOVERNMENT LEASING PROVED FAILURE ONCE

The policy of the Federal leasing of mineral lands was in effect a little more than forty years. The operation of this system did not bring about any substantial development of mineral resources, did not bring to the Government any substantial income, and did create much discord.

In accordance with President Polk's recommendations, the Acts of July, 1846, and March, 1847, made a radical change in the disposition of mineral lands on the public domain, abolishing leases and substituting cash sales therefor. By the Act

of 1849 the charge of mineral lands was transferred from the War Department to the Department of the Interior.

The more liberal policy of dealing with public lands soon manifested its advantage. As early as the year 1854 the Commissioner of the General Land Office gave expression to the following language: "It is impossible to portray the benefits already derived by the West from this system. Immense regions have been disposed of that were thought to be wholly unsalable because of the difficulty of access. The Government has consequently been benefited." Reference was made to the fact that the Government had already received $146,195,641 for the sale of land in the South Atlantic territory, "the benefits of which go chiefly, if not entirely, to the people of the old States. This amount, it will be remembered, is exclusive of the sum of more than $48,250,000 net receipts for imports at the ports of Florida and Louisiana, which went in the Treasury, and by which the people of the old States were also proportionately benefited." Thus it will be perceived that mutual benefits to an immense extent and in about equal proportion have flowed to both the old and new States under this judicious system, and if either has apparently the advantage it is all in one great family and not a sufficient ground of controversy between fathers and sons. "The true policy of the land system is, first, to encourage the actual settlement and improvement of the public domain."

LACK OF COOPERATION CAUSE OF SERIOUS LOSS

A gratifying number of accessions to the American Mining Congress has resulted since the last annual meeting. There is reason to believe that new members will continue to enter at an increasing rate. A campaign for increased membership is under way and will gain in effectiveness as it progresses.

Never before in the history of the world has the value of cooperation been so well understood. Germany's accomplishments during the past year and a half have demonstrated the value of team work more than ever before has been the case.

Humiliating as it is to acknowledge, most of the woes of those who own or operate mines are due to their lack of cooperation. Hundreds of opportunities have been lost for the same reason.

Had there been proper team work in the mining industry millions of dollars would have been devoted before now to research work by the government that in the absence of cooperation have remained unappropriated. Had equitable sums been available through the years there is no telling how much further advanced the industry might be.

That those directing the mining operations of the country have not been attentive to appeals for organized effort is indecated, in one instance, by the fact that of 90,000 active mining men in the United States less than 1,600 have affiliated themselves with the American Mining Congress.

INGALLS, SAUNDERS, SCHOLZ SHARPLESS AND WINCHELL

Prsidents of the greatest three organizations within the mining industry stood before an audience of mine operators, legislators, and experts of the Geological Survey, the Bureau of Mines and the General Land Office last month and pleaded for consideration at the hands of Congress. It was the occasion of the meeting called by the Mining and Metallurgical Society. The presidents referred to are W. R. Ingalls, of the Mining and Metallurgical Society of America; W. L. Saunders, of the American Institute of Mining Engineers and Carl Scholz of the American Mining Congress.

The sessions, which were held in the auditorium of the National Museum, through the kindness of the officials of the Smithsonian Institution, were very impressive. They started in motion influences that will not expend their energy for years to come.

F. F. Sharpless, the secretary of the Mining and Metallurgical Society, looked after the preparation for the meeting with such thoroughness that there was not a single hitch in carrying out the program.

Special mention is due Horace V. Winchell, chairman of the committee on resolutions. Mr. Winchell combines a remarkable store of energy, with a degree of personal magnetism and a keen intelligence, that make him a great asset to the mining industry.

WHOLE STRENTH OF MINING INDUSTRY TO BE MARSHALLED

A distinguished company of mining men assembled in Washington last month and discussed the means of securing urgently needed revision of mining laws. These men were made to realize, we believe, the necessity of marshalling the full strength of the industry if any legislation is to be secured.

It was brought out very plainly that there is no chance of getting bills through Congress without concentrating great pressure upon them. Sad as it is that a great industry such as is mining has to maneuver and campaign to get consideration at the hands of the nation's lawmakers, yet it is only too true that it is necessary. Theoretically it is all wrong but the condition exists and it must be met.

Some of the biggest men in industry, as a result of the recent meeting, probably realize now as never before the necessity of cooperating in an effort to see that mining gets its just deserts. Not only is mining discriminated against but it is forced to continue to wear clothing of the same size as was fitted to it in 1872. The industry has outgrown this clothing, which has become a straight jacket. It is going to take a lot of hard work to get rid of the laws of 1872 but we believe that at last there will be sufficient concert of action directed to this end by the mining men of the country to accomplish it. There is little doubt of the passage of the bill of Senator Smoot providing a commission for the investigation which is to precede the revision of the mining laws. Whether the Taylor bill can get through the House is the question. Mr. Taylor can be relied upon to do his part. If the mining industry will hold up Mr. Taylor's hands his task will be brought within the possibility of accomplishment.

The gathering here of leaders in the industry has had the effect of calling particular attention to the value of maintaining with impressive support such an organization as the American Mining Congress. The American Mining Congress should have the support of every association of mining men in the country and of every individual operator who is not affiliated with such an association.

Legislators are impressed with the needs of agriculture because its numerical strength in practically every Congressional district in the United States is very evident. Mining is unfortunate in being confined to restricted areas generally far removed from centers of population. The needs of the industry are not brought to the attention of the great majority of Senators and Representatives through actual contact with the industry or its people. Therefore it is so necessary to have an organization, representing as nearly the whole industry as possible, to do missionary work among those whose attention must be called specifically and repeatedly to the needs of mining.

TWO IMPORTANT POINTS IN AMERICAN HISTORY

The growth of the United States as a world power began at Sutter's Creek in 1848—a growth so rapid as to astonish the world. During the dark days of the Civil War the gold of California and the silver of Nevada saved the nation's credit and played an important part in the preservation of the Union.

No opportunity should be lost in impressing these two important facts on the public.

Recent Legal Decisions

GRUBSTAKE CONTRACT

An agreement stipulated that one of the parties is and shall be a full-fledged partner with the three other persons named, and have one-quarter undivided interest in all claims, lodes and water rights acquired or to be acquired and owned by the above-mentioned parties, the agreement stating that the one person so made a partner is to furnish the above-mentioned parties with provisions from time to time up to a stated date. The consideration for the transaction was $30,000 and the agreement provided for the payment of $6,000 cash, the balance of $24,000 to be paid "of the first money taken out of the ground." In the controversy over the mining operations and an action to dissolve the partnership the words "of the first money taken out of the ground" were held to mean the first money taken out of the ground to which the grantee was entitled, which would be one-fourth of the amount so taken, or the gross amount to which the grantee would be entitled and not the net proceeds, and where it appeared that the aggregate gross amount was $26,038.30, the grantee is entitled to have one-fourth thereof, or $6,509.57, applied to the $24,000 deferred payment. But as the business of the firm resulted in a deficit the adjustment had to be apportioned in the payment of the indebtedness of the firm, and where it appeared that the total indebtedness was $19,314.94 the original grantee was held liable to the amount of $10,628.76.

Lesamis *vs.* Greenberg, 225 Fed. 449, p. 450 (August, 1915).

BANKRUPTCY—INSOLVENCY

Payments made by an insolvent mining corporation that amount to a preference constitute such acts of bankruptcy as will cause the corporation to be adjudged a bankrupt, where the corporation had reasonable cause to believe that the payments would effect a preference and such preferences are available.

Wise Coal Co. *vs.* Small, 225 Fed. 524, p. 525.

RIGHTS OF PARTNERS

On the sale of assets of a partnership the partners will share equally in the proceeds and be entitled to have the same applied in that proportion to their indebtedness to the firm and the adjustment in the end must be on the basis of an equal division of the partnership property; and mining claims held by three persons at the time of making an agreement with a fourth by which he should become a partner with a one-fourth undivided interest in all the mining properties then owned or to be acquired, and pursuant to which agreement the three persons conveyed to the fourth the undivided one-fourth interest in the mining property, which constitutes such claims partnership property and they are subject to the partnership indebtedness as partnership assets.

Lesamis *vs.* Greenberg, 225 Fed. 449, p. 452.

CORPORATION TAX

Section 5506 of the General Code of Ohio refers to fees, taxes and penalities required to be paid only by corporations doing business and does not intend that a receiver shall pay such fees, taxes and penalties, as the penalties are required to be paid only by corporations doing business, and the purpose of the statute is to fix a lien for the payment of the tax by the corporation required to pay it, upon the property employed in the transaction of its business or in the hands of a receiver, or if the property is gone into the custody of a court of equity through its receiver, and the recovery must recognize the lien of the statutes upon the assets in his hands for the tax of a preceding year, imposed upon the corporation when it was doing business, but this section of the statute does not impose a tax when the reason for the tax and its only justification no longer exists. This construction of this section reconciles it with the other sections of the statute on the same subject, which the court is bound to effect if possible, and brings about a result not only equitable, reasonable and just, but also in consonance with the clear intention of the legislature to impose a tax upon the right granted by the State to be a corporation and to continue to do business as such.

Keeney *vs.* Dominion Coal Co., 225 Fed. 625, p. 627.

PROPERTY IN HANDS OF RECEIVER

The assets of a corporation in the hands of a receiver do not belong to the corporation, but to the creditors, and the court holds such assets for distribution to creditors as their respective interests may appear, under the rule that when a corporation becomes insolvent it is so far civilly dead that its property may be administered as a trust fund for the benefit of its stockholders and creditors.

Keeney *vs.* Dominion Coal Co., 225 Fed. 625, p. 628.

FRANCHISE TAX

Under the constitution of Ohio the power of taxation of privileges and franchises is limited to the reasonable value of the privilege or franchise conferred originally or to its continued value from year to year; and these limitations prevent confiscation and oppression under the guise of taxation, and the power of such taxation cannot extend beyond what is for the common or public welfare and the equal protection and benefit of the people, and where the property of a corporation has passed into the hands of a receiver and the corporation ceased to do business, the franchise of such a corporation to be a corporation and to conduct its authorized business as such is of no value to the receiver and to the creditors whose property he holds and whom he represents, and the franchise tax imposed by the statutes of Ohio on such a receiver is, in its operation, confiscatory and oppressive, and to that extent unconstitutional.

Keeney *vs.* Dominion Coal Co., 225 Fed. 625, p. 628.

FAILURE TO DECLARE DISSOLUTION

By Section 5509 of the General Code of Ohio it is the mandatory duty of the Secretary of State to cancel the articles of incorporation of a corporation that fails or neglects to make report or to pay its franchise tax for ninety days after the statutory time and thereupon its franchise would come to an end and the tax could not subsequently be imposed. And where a corporation becomes insolvent and passes into the hands of a receiver, the mere fact that the corporate officers did not begin proceedings for a dissolution does not enable the State to impose the franchise tax, where if the Secretary of State had done his duty under the mandatory act the corporation would have been dissolved.

Keeney *vs.* Dominion Coal Co., 225 Fed. 625, p. 629.

CONTRACT OF SALE

In an action by a purchaser of a mine to recover money paid by the purchaser to the seller upon a contract for the sale and purchase of the mine, where the plaintiff alleges that he was induced to agree to make the purchase by false and fraudulent representations made to him by the seller, to the effect that there was a certain vein in the mine at a certain place or level, and where the plaintiff had fully rescinded the contract before the commencement of the action, the defendant is not entitled to introduce evidence to prove the value of the mine, where there is no claim on the part of the defendant and no allegation in the plaintiff's complaint, that the defendant either represented or misrepresented the value of the mine as a whole at the time the situation is constantly changing.

Cohen *vs.* Stockton (California), 151 Pac. 741, p. 742 (August, 1915).

DUTY TO FURNISH SAFE PLACE

The rule requiring a mine operator to furnish the miner a safe place in which to work does not generally apply when the miner himself is engaged in making the place and when the situation is constantly changing.

Calumet Fuel Co. *vs.* Rossi (Colorado), 151 Pac. 935, p. 936 (October, 1915).

MINER'S KNOWLEDGE OF CUSTOM

In the absence of a positive rule of law imposing upon a mine operator the safe-guarding of an entry or a travelingway through a miner's room there is no reason why a general custom, known to the miner, under which miners assume the duty of keeping safe the rooms and the ways, is not binding upon the miner; and in an action by a miner injured by a fall of rock from the roof the mine operator is entitled to have his case presented to the jury on his theory and he has the right to have the jury pass upon the matter of the custom and the miner's knowledge of it; and instructions by the court to the jury which prevented the mine operator from having his case thus presented were erroneous and sufficient to cause a reversal of the case.

Calumet Fuel Co. *vs.* Rossi (Colorado), 151 Pac. 935, p. 936 (October, 1915).

EFFECT OF SURRENDER CLAUSE

A surrender clause in an oil and gas lease which gives to the lessee the right at any time to surrender and terminate the lease, after which all payments or liabilities should cease and terminate, deprives the lessee of the right of specific performance, directly or indirectly, until he has performed the contract or placed himself in such a position that he might be compelled to perform it on his part.

Hill Oil & Gas Co. *vs.* White (Oklahoma), 151 Pac. 1051, p. 1052 (October, 1915).

AGREEMENT TO EXECUTE

An agreement between two persons providing that when the first contracting party acquired title to certain land on which he had filed, he would for the consideration specified execute to the other party an oil and gas lease. In an action on such contract where under the agreement the lease was to run for fifteen years, or as long thereafter as either oil or gas should be produced, and where the agreement provided that in case operations were not commenced in fifteen years the lessee was to pay an indefinite sum for each additional year, the commencement of operations was delayed, thereby leaving it entirely to the option of the lessee to either drill or not to drill for oil or gas, and under the rule that contracts unperformed which are optional as to one of the parties, are optional as to both, a court will not order the specific per-

formance of the agreement to execute the lease, on the ground that the lease contract sought to be enforced presents terms which preclude its favorable consideration at the hands of a court of equity.

Hill Oil & Gas Co. *vs.* White (Oklahoma), 151 Pac. 1051, p. 1052 (October, 1915).

OIL AND GAS LEASE

Specific performance of an agreement to execute an oil and gas lease will not lie unless the agreement is certain and fair, and just in all its parts; and in an action to enforce specific performance of such a contract to execute an oil and gas lease, any element showing the contract unfair or unjust and against good conscience, will justify the court in refusing a decree of specific performance, although the lease, had it been executed, might offer no sufficient grounds for cancellation.

Hill Oil & Gas Co. *vs.* White (Oklahoma), 151 Pac. 1051, p. 1052 (October, 1915).

GRANT OF OIL AND GAS

Oil and gas while in the earth, unlike solid minerals, are not the subject of ownership distinct from the soil, and a grant of the oil and gas is a grant, not of the oil that is in the ground, but of such a part as the grantee may find, and passes nothing that can be the subject of ejectment or other real action.

Hill Oil & Gas Co. *vs.* White (Oklahoma), 151 Pac. 1051, p. 1053 (October, 1915).

BANKRUPTCY PROCEEDINGS

In proceedings of creditors to have a mining corporation declared a bankrupt on the ground of the alleged indebtedness of the corporation to the petitioners, the stockholders of the corporation may intervene if the directors fraudulently fail and refuse to oppose the petition or interpose any defense, and where the petition to intervene shows that the directors are adversely interested and are permitting the property to be sold so that they might acquire it at less than its value; and in such case the stockholders are not required to take the ordinary preliminary steps before bringing suit.

Ogden *vs.* Gilt Edge Consolidated Mines, 225 Fed. 723, p. 728.

CUSTOM AS TO PROPPING ROOF

Under the Kentucky statute of 1913 and before the amendments of 1914 it was the duty of a mine owner, after a miner had selected and marked them, to furnish to the miner a sufficient number of caps and props to be used by him in securing the roof in his room, and at such other working places where by law or custom of those usually engaged in such employment it was the duty of the miners to keep the roof propped; but this statute does not apply where, by custom or rule of the mine, the duty of propping or timbering does not devolve upon the miner himself, and where an injured miner in an action for damages shows that under the custom of the mine no duty of propping devolved upon him.

Carter Coal Co. *vs.* Hill (Kentucky), 179 Southwestern 2, p. 4 (October, 1915).

RISKS NOT ASSUMED

Section 28 of the Tennessee act of 1903 requires that the bucket shall be covered and there shall be certain structures inside of the shaft to make safe the ascent and descent of the miner, and this act applies to a mine incomplete, but where a shaft had been sunk to a depth of more than 250 feet, from the foot of which a drift was run to the location of an old shaft on the property with a view to drilling upwards and reaching the bottom of such old shaft and thus connecting the two, and where men were taken up and down the new shaft for the purpose of working in the incompleted mine, and in such addition and in so using the shaft there was as much need to the miners of the protection required by the statute as there could be when the mine was completed and in active operation. The miners in thus using the shaft and in being lowered and raised in the bucket did not assume the risk of the operator's failure to comply with the statute, for the reason that to hold that miners did assume the risk would be equivalent of a repeal of the statute, as this would be a continuing invitation for the operator to forbear compliance with the statutory provision and the very purpose of the statute was to protect those who were unable to protect themselves, occupying as the miners necessarily do a position much inferior in financial security to that of the mine operator.

American Zinc Co. *vs.* Graham (Tennessee), 179 Southwestern 138, p. 139 (October, 1915).

MISTAKE OF LAW

A coal lessee accepting a lease to mine coal and pay a certain stipulated royalty per ton for all the merchantable coal mined and removed and a fixed minimum cash rental of a certain stated amount per annum during the continuance of the lease, cannot refuse to pay the stipulated royalty on the ground of a mistake in reliance upon the lessor's ownership of one of the four tracts and that by reason thereof more coal had been paid for than was under the other three tracts, where all the facts concerning the disputed title were of record when the lease was made and the mistake, if there was a mistake, was a mistake of law and not of fact.

Clark *vs.* Lehigh & Wilkes-Barre Coal Co. (Pennsylvania), 95 Atlantic 462 (July, 1915).

DANGEROUS CONDITIONS

The mining act of 1891 of Pennsylvania does not relieve the mine operator from liability

for his own neglect or failure of duty; and if through any neglect or failure of duty he causes injury to one of his employes the general rule applicable in such cases subjects the owner to damages for such default, and if there is a dangerous condition existing in the mine which is permitted by the negligence of a mine foreman, resulting in injury to an employe, the mine owner will be responsible if he has knowledge of the fact and takes no step to remove it, as the owner cannot neglect his duty and escape liability, and the statute expressly provides that the owner shall use every precaution to insure the safety of the workmen in all cases whether provided for in the act or not.

McCollom *vs.* Pennsylvania Coal Co. (Pennsylvania), 95 Atlantic 380, p. 391 (May, 1915).

LIABILITY FOR NEGLIGENCE

Rule 44 of the act of 1891 of Pennsylvania requires an efficient alarm to be provided and attached to the front end of every train of cars operated by locomotive in any mine or part of a mine; and this applies not only to the main roadway of the mine but extends to every siding in every heading of the mine, and the duty to provide the alarm is one which in its very nature devolves upon the mine owner in so far as providing the alarm is concerned, and the future or the negligence of a mine foreman to perform this duty, if known to the operator, or if it had continued for so long a period that it should have been known to the operator or owner, will render him liable for injuries resulting from either his own or the foreman's negligence in this respect.

McCollom *vs.* Pennsylvania Coal Co. (Pennsylvania), 95 Atlantic 380, p. 381 (May, 1915).

SPACE AT SIDE OF TRACKWAY

Section 8582, Burns' Statutes of Indiana, makes it unlawful for an owner or operator of a coal mine to construct an entry or trackway in a coal mine without a space of at least 2 feet on one or both sides so that drivers may get away from the car and track in event of collision, wreck or accident, and the term entry or trackway applies to a place where a track is laid rather than to the track itself and was intended to give sufficient room to provide a safe place for the car drivers in case of an accident, and the failure of an operator or owner to furnish such space may be the proximate cause of an injury to a driver injured after an accident produced by other causes, where he is unable to escape by reason of the operator's non-compliance.

Elder *vs.* Erie Canal Coal Co. (Indiana Appellate), 109 Northeastern 805, p. 806 (October, 1915).

VIOLATION OF STATUTORY DUTY

The purpose of the Virginia statute of 1912, known as the Mining Act, was to promote the safety of miners and was intended to relieve employes or miners in mining operations from exercising that degree of care and diligence for their own safety which the law required prior to the enactment, as it expressly provides that it shall be the duty of each miner to properly prop and secure his place in order to make the same secure for him to work therein and prohibits a miner from working unless he has props and timbers sufficient to make the place secure and if a miner's place becomes dangerous and is known so to him he is guilty of contributory negligence in not leaving his working place until sufficient props arrive to make the place secure, and the statute imposes the duty on him to leave his working place as soon as it becomes insecure from lack of props as well as upon the operator to furnish props, and the violation of this statutory duty by a miner will preclude a recovery either for an injury or death.

Virginia Iron, Coal & Coke Co. *vs.* Asbury (Virginia), 86 Southeastern 148, p. 149 (September, 1915).

ENRIQUE CUEVAS

Whose paper on nitrates at the Pan American Scientific Conference excited much discussion.

No Cadmium Ore Produced.

Cadmium in this country has been recovered in smelting zinc ores or in smelting lead ores. No known ores in the United States contain enough cadmium to be called cadmium ores.

(Continued from page 4)

Abstracts of some of the papers read before the conference follow:

EMPLOY 6,000,000 MEN

Mines of World Give Occupation to Myriad of Workers—Fay Gives Figures

The magnitude of the mining industry may be grasped when one realizes that more than 6,000,000 men are engaged in the mines of the world, says Albert H. Fay, a mining engineer of the Bureau of Mines in a paper read before the Pan-American Scientific Conference. Of this number 3,800,000 are employed in the coal mines, and 2,200,000 in the metal mines. In addition, millions more are engaged in allied industries dependent directly upon the mines for coal and metal.

Mining is one of the hazardous industries, in which three out of every 1,000 men employed are killed each year by reason of some accident. While world-wide data relating to non-fatal injuries are not available, yet reports for all metal mines in the United States, over a four-year period, show that thirty men per 1,000 are injured sufficiently to cause a loss of time of twenty days or more, and 150 per 1,000 receive minor injuries resulting in a loss of time of one to twenty days. A reduction of 50 per cent in the number of accidents would mean a saving of 9,000 lives every year, in addition to reducing the loss of time and suffering resulting from non-fatal injuries.

The principal causes of accidents are as follows: Falls of roof represent about 48 per cent of the fatalities in coal mines and 35 per cent in metal mines; explosives, 11 to 15 per cent in metal mines and 5 per cent in coal mines; haulage systems, 15 to 20 per cent in both coal and metal mines; electricity, 4 per cent; and mine fires, gas and dust explosions in coal mines, from 12 to 15 per cent.

In order that accident records of one country may be comparable with another, they should be collected and tabulated on a uniform basis, being careful to separate each branch of the industry from all others. The number of men employed should be clasisfied as underground and surface employes, with a corresponding grouping of fatal and non-fatal injuries by principal causes.

Accident rates are usually calculated on the number or men employed, the tonnage of coal produced, or a percentage basis, none of which is as correct as when computed on a man-hour basis of 2,000 or 3,000 working hours per year. The latter takes into consideration the actual length of time that the men are exposed to the mining risk, while the other methods of rating do not.

In all industries there are a certain number of accidents that are inherent, for which it is impossible to place he blame on any one. These equal about 50 per cent in the mining industry. The responsibility for the remainder may be placed about equally on the operator and the employe, as shown by the records of the inspectors of the Union of South Africa.

Accidents may be reduced by more stringent laws concerning the operation of mines, with penalties for all violations, whether operator or employe. The education of the miner to realize the dangers under which he works will have much to do with accident prevention. A common language, understood by both foreman and miner, is of prime importance. Improved safety appliances will lessen the dangers incident to the industry. The cooperation of State and Federal organizations with operators' associations, labor organizations, operators and employes; and, last but not least, eternal vigilance on the part of all, will minimize the mine-accident hazard.

Radium and Associated Metals

By C. L. Parsons.

The chief ores from which radium is made are pitchblende, occuring in Austria and Colorado; carnotite, occurring in Colorado, Utah, and Australia; and autunite, occuring in Portugal and Australia.

Radium is extracted from these ores by fusion methods or by leaching by acids. The methods for extracting redium from pitchblende are well known. The method devised by the Bureau of Minles for extracting radium, uranium, and vanadium from carnotite is entirely new; the cost of extraction is much less than the method heretofore used, and the efficiency of extraction is higher. This method consists essentially in heating the ore in stoneware extraction vessels with hot concentrated nitric acid. The use of strong hot nitric acid is especially essenital, owing to the fact that it has a high solubility coefficient for radium-bearing sulphate, and accordingly dissolves any such sulphates as may be present in the ore. This would not be the case if dilute acids were used. The strong nitric acid solution is diluted and nearly neutralized with sodium hydroxide, barium chloride added, and radium and barium precipitated by means of sulphuric acid. From the filtrate the uranium and vanadium are recovered as sodium uranate and iron vanadate. The radium-barium-sulphate is reduced by charcoal, dissolved in hydrochloric acid, and the radium crystallized from the barium, first in the form of chlorides and finally as bromides. By this method over 90 per cent of the radium present can be recovered from carnotite. The cost of extraction, including the cost of ore,

20 per cent amortization of plant, research costs, insurance, repairs, etc., has been $37.599 per gram for the first 4 grams obtained.

Geological Surveys

By David White

This paper is designed mainly for the information of persons interested in the work of a geological survey or in the establishment of a publicly organized survey. It discusses the objects of such an organization, the principles which should be safeguarded in order to make it of greatest benefit to the public, and the costs of the geological investigations in particular. Educational and research work are urged as inherent duties of a governmental scientific institution. The recommendations of principles are largely founded upon the experiences of the United States Geological Survey. The cost data, based upon the records of that survey and two prominent State surveys, relate, for the most part, to the costs for field investigations and office preparation of reports, comprising the purely geological part of the work, and are expressed in dollars per square mile of detailed work on the 1:62,500 scale in different geological provinces, embracing varied field conditions, types of structure, and mineral deposits.

Iron Ores of the Americas

By C. K. Leith

The distribution of the present production of iron ores by kinds is summarized with the aid of table and charts. The distribution of the reserves is summarized by table and charts. A comparison is made of the distribution of the present production and the distribution of reserves, bringing out the fact that there are large reserves of ore in the two Americas which are not now being drawn upon.

A summary is made of the factors which determine why certain ores are used and others are not used. All these factors are summarized under the general term "availability." The point is made that the availability (and therefore value) is determined only in part by the intrinsic qualities of the ore and large by the effort and money spent on the ore. That any intelligent formulation of laws of governmental control of ore reserves in the way of taxes or other measures requires careful consideration of this point in order that opportunity may be left open for the application of the human factors which so largely determine the availability and value of an ore body.

Because of the great variety of factors entering into the problem, it is difficult to forecast the distribution of future production or iron ores; but certain recent tendencies are enumerated which seem to present certain changes for the future.

Braden Copper Company

By B. T. Colley and R. E. Douglas

The mines of the Braden Copper Co. have been known for 100 years, more or less, and were worked by many owners during that time. The ore is a shattered andesite forming the circumference of an extinct volcano.

In 1904 Mr. Barton Sewell and Mr. Wm. Braden and their friends formed the first Braden Copper Co. They built a small mill and later a small smelter, and extracted metal by means of crusher, jigs, tables, and buddles, and smelted the concentrate to matte in blast furnaces. The property was taken over by the present holding company in 1908.

A railroad and a hydro-electric plant were immediately started and rushed to completion. It was planned to extract the metal by crushing and then by Woodbury jigs, Wilfley tables, and Frue vanners. The resulting concentrate was to be treated in one of two ways; either by roasting, leaching with acid fabricated from the roaster gases, and precipitating the copper from the solution by electrolysis, or by direct smelting. Both methods were thoroughly tested. Subsequent enlargements of the plant made necessary by further increase in the ore body precluded leaching because of lack of power.

The concentrating plant passed through a long period of experimentation to its present flow sheet, which is as follows:

Gyratories, rolls, Symons crushers, rolls, Marcy mills, Wilfley tables, Hardinge mills, oil flotation, seconded by air cells, and partial filtration of the concentrate.

The smelter, having adopted the blast furnace instead of the reverberatories, chiefly because the cheap electricity rendered impossible the utilization of the waste heat power, passed through briquetting, pugging and sintering to nodulizing. The plant will now dry the concentrate with waste heat from nodulizer, and then nodulize. The nodulizer product will be smelted in blast furnaces and the resulting matte converted to blister copper. Later an electrolytic refinery may be added.

Export Coal Considerations

By G. S. Rice

In the United States, except in the antracite district of Pennsylvania, coal-mining conditions are generally more favorable than in Europe. The mines are comparatively shallow, the coal beds are level or little folded, beds less than 2½ feet thick are seldom worked, except in the anthracite mines less fire damp is encountered, and less dead work is required.

The average value of coal in the United States on cars at the mine in 1913 is reported as $1.18 per short ton ($1.30 metric) for bituminous coal and $2.13 per short ton ($2.35 per metric and $2.39 per long ton) for anthracite. In Wales in 1913 the average value per long ton at the mine for all kinds was $2.86, and in Great Britain as a whole $2.48 ($2.44 metric). In the German empire the average value for all kinds of coal f.o.b. cars at the mine, in 1913 was $2.50 per metric ton, and for Westphalian coal $2.61.

Net mining profits in Great Britain and Germany are between 25 and 50 cents per ton, as compared with probably not more than 5 cents for bituminous coal in the United States. Evidently, in the United States costs at the mine on export coal cannot be much reduced, but railroads may perhaps be able to lower their tariffs for such coal.

Because of low mining costs, the on-ship price of United States bituminous coal is less than that of corresponding British and German coals at their home ports. In 1913 the average declared value of all classes of British coal exported was $3.40 per long ton ($3.33 metric) and the price of best Welsh steam coals, f. o. b. Cardiff, ranged from $4.50 to $5.10 per ton ($4.40 to $5 metric). Westphalian steam lump coal, f. o. b. Hamburg, ranges from $4 to $5 per metric ton.

Compared with sailing distances from British coal ports, those from the chief United States export ports are 460 miles less to Atlantic ports of South America, and via the Panama Canal 2,560 miles nearer to Pacific ports. Compared with German ports, distances are 767 miles less to Atlantic coast ports and 2,867 miles less to Pacific coast ports via the Panama Canal.

Yet in spite of higher prices at shipping ports and longer distances, coal exports to South America are chiefly from Great Britain.

Tin Ores in Bolivia

By Scoville E. Hollister

Present tin-milling methods, except in the case of a very few companies, are little different from those practiced years ago. This condition is gradually changing, and the tendency is toward better methods and greater savings. The principal ore is the oxide, cassiterite. Mining is yet in the high-grade stage, the mills in most cases treating 10 per cent ore. In the past a large part of the production has been from very high-grade shipping ore. This has been the salvation of some of the present large companies, counterbalancing the wasteful operations in their other departments. With the exhaustion of the present high-grade deposits, plants must be equipped to treat low-grade ore, of which there are large reserves.

The plants are nearly all equipped to treat oxidized ores, those found first in mining operations in this country. With the pyritic ores, encountered at depth, the milling becomes more complicated and requires different machinery. Several companies are now using automatic-roaster, magnetic-separator plants for the separation of the cassiterite and pyrite. This is proving satisfactory.

Arsenopyrite causes trouble because of penalties imposed by the smelters for arsenic, but this is kept within the contract limits by mixing with clean concentrates or by roasting.

Except in the district of Potosi, no tin is smeltered in Bolivia. There a little low-grade concentrate is treated, a tin of about 95 per cent purity resulting.

Placer mining, except in small operations, is not practiced. The various districts have been prospected and several reported upon favorably, but no further action has as yet been taken.

Labor is cheap, but not efficient. Holidays are numerous. This, in combination with expensive supplies, materials and transportation, makes mining and milling in Bolivia difficult. However, conditions are becoming better, and with the United States wanting tin to smelt, business relations between the two countries should improve.

Mining in Ecuador

By J. W. Mercer

The author gives a full description of the country, including industries, agricultural products and means of transportation.

Owing mainly to scarcity of means of transportation, the mineral resources of Ecuador have hardly been investigated. At present there is but one mining enterprise in actual operation—the Zaruma gold mines in the south. Iron, lead, zinc and copper ores have not been found in workable quantities. Oil has been discovered in some places, mainly along the Pacific coast, near Guayaquil. In 1913 the production was at the rate of from 10,000 to 20,000 barrels a year.

Coal—a low grade of lignite—has been found in some places, but the seams have not been worked. Mercury has also been found, but not developed. As to silver, some attempts have been made to work a few mines, but without success.

Practically gold is the only metal produced. The sand and gravel of nearly all rivers contain this metal, which the Indians separate by washing. Systematic placer mining has been unsuccessfully attempted.

The Zamura gold mines are about 150 miles south of Guayaquil. The altitude varies from 2,000 to 5,000 feet above sea level. The country rock is andesitic, and is cut by numerous faults. The veins are mainly of quartz, and in the neighborhood of the fault often contain large quantities of calcite. The sulphide minerals (pyrite, chalcopyrite, blende and gelena) also occur. The ore as milled is a mixture of quartz and calcite, with perhaps 10 per cent of sulphides. It is treated by first crushing, then regrinding in tube mills, followed by agitation in cyanide solution. Water power

from several large rivers near the mines is utilized. There is no railroad connection, and all freight is transported by mules. At present the mines employ 500 Ecuadorians and 40 foreighners. The natives are good workers, and get about 50 cents (American) a day. Miners, whose pay is based on meterage of hole drilled, make between $1 and $3 a day.

Value of Technical Societies

By Rossiter W. Raymond

The secret of the rapidity of modern technical progress is the rapid and abundant interchange of ideas. Knowledge in itself is not power. It is simply weight or force. Knowledge in motion is power; and the formula Mv^2 applies to spirit as well as to matter.

Technical societies promote the acceleration of progress: (1) by bringing workers and students together; (2) by persuading them of the advantage of publicly exchanging, rather than jealously hiding, their discoveries and experiences; (3) by training them in the art of clear and conclusive statement; (4) by providing the means of accurate publication, appropriate circulation and permanent preservation of the important records and results of practice and discussion; (5) by making professional ability known to a wide circle of experts, and thus facilitating personal promotion and success; (6) by assisting in research through the use of their libraries and files of exchanges, not only by those who can personally consult such sources of information, but also by those who are too far away to do this directly, but can enjoy its benefit through the assistance of competent experts provided by the societies, and, finally (7), by lessening the loss to science and art caused by the death of experts who carry to the grave their acquired knowledge and wisdom and leave no man the better for it all.

These different functions of technical societies are discussed in the paper at some length. Under the head of publications, especially, the proper sphere and nature of the publications of a technical society as distinguished from newspaper articles, contributions to technical magazines, graduates' theses, and formal treatises, text-books, and encyclopedias is explained, and the special usefulness of competent editorial revision is emphasized.

On the basis of this general description, it is suggested that membership in a great technical society ought not to be limited by unnecessary conditions. Moreover, since the first step is to get men together, and the next to keep them together, it may well be understood at the beginning that the united influence of such a society is not to be used for any propaganda whatever. The society should be a free forum for the discussion of all pertinent subjects, and not a tribunal for pronouncing judgment.

This point is argued at some length, and it is shown how attempts to utilize such a society for the benefit of some cause outside of its prime purpose reacts against that purpose itself.

In short, the author maintains that many benefits which might well be sought by special guilds or unions should not be sought through a technical society such as he has in mind, and defines by quoting from the charter of the American Institute of Mining Engineers the statement of the object of that society as:

"Promoting the arts and sciences connected with the economic production of the useful minerals and metals and the welfare of those employed in these industries by means of meetings for social intercourse and the reading and discussion of professional papers and to circulate by means of publications among its members and associates the information thus obtained."

SOUTH DAKOTA HAS PRODUCED NEARLY $200,000,000 IN GOLD

The mine production of gold from South Dakota in 1915 was $7,390,000, compared with $7,333,508 in 1914, and that of silver was 193,000 ounces, compared with 176,642 ounces in 1914. A nominal quantity of lead was produced. These are preliminary estimates reported by Charles W. Henderson, of the United States Geological Survey. Since 1876 South Dakota has produced $192,677,000 in gold, and 6,026,000 ounces of silver.

The Homestake mine and amalgamation-cyanidation mills were operated continuously throughout the year, with an increased output.

The Golden Reward cyanidation mill was operated steadily on siliceous ore from its mines, and during the later part of the year an additional product was sent to the mill in the form of roasted sulphide or "blue" ore. These sulphide ores had never before been treated successfully by cyanidation. Results indicate 90 per cent extraction as compared with 35 per cent without roasting. Sulphide ore of sufficient grade is sent to smelters.

The Mogul cyanidation mill was operated steadily on company and custom ore, with an increase in capacity. The Reliance cyanidation mill was also operated steadily on company and custom ore. The Trojan mine and cyanidation mill were operated regularly. The Wasp No. 2 Co. continued to operate its dry-crushing cyanidation mill, the mine being worked by the open-cut system, using a steam shovel for stripping. The Bismarck mine and mill were idle. The new 50-ton cyanidation mill on the Rattlesnake Jack mine was operated during part of the year. Sinking continued at the Oro Hondo property.

A small production of placer gold was made in Custer, Lawrence, and Pennington counties. In Pennington County, experimental milling was continued on the gold-antimony-iron-lead-zinc ore of the Home Lode Co., at Silver City, and development work was done on properties near Hill City. The dredge at Mystic, on Castle Creek, was moved to the John Day district, Oregon.

(Continued from page 8)

great burden that it has been carrying for many years, but there must be active and earnest pressure by every mining man on every legislator who can be reached.

PERMANENT COMMISSION PROVIDED

Mr. Winchell made a motion providing that a permanent commission be created to be composed of five members of the Mining and Metallurgical Society, five members of the American Institute of Mining Engineers, and five members of the American Mining Congress. These fifteen are to name ten other members from districts not otherwise provided for. The commission is to be active the year round in keeping alive the necessity for the revision of mining laws.

Senator W. A. Clark enthusiastically seconded Mr. Winchell's motion.

Continuing the discussion some favored the congressional commission of three members, while others believed five would be better. Mr. Winchell championed the commission of five and apparently succeeded in convincing those assembled that this number would be better in order that as many different parts of the country could be represented as possible.

At the close of the discussion the morning session adjourned.

AFTERNOON SESSION

At the afternoon session, W. L. Saunders, president of the American Institute of Mining Engineers, occupied the chair.

He called upon Senator Smoot for his views in regard to revision of mineral land laws, and for an explanation of his bill looking to this end.

Senator Smoot declared that for twelve years he has been endeavoring to obtain relief from the oppressive features of existing mining laws. He said he had found it very hard to correct one fault without straightening out the entire code.

Senator Smoot in his address presented some of his views with regard to the proposed government leasing policy. These were practically the same as those set forth in the Senator's address printed in the November issue of THE MINING CONGRESS JOURNAL.

EXPECTS BILL TO PASS

Senator Smoot believes that his bill will be passed early at this session. In the Mines and Mining Committee of the Senate there is decided objection to increasing the commission to five. He said the government could amply afford to pay $25,000 to aid the industry which is the very blood of its commercial life. He stated that he does not want the men who may form this commission to be under obligation to any man or any set of men who may raise the money to provide for their expenses and remuneration. He believes it would be a great mistake to have a commission which would serve without pay.

He stated it to be Senator Walsh's idea to have two lawyers on the commission as proposed in his bill. The Senator stated that objection which had been raised to lawyers on the commission, he believed to be without foundation. He pointed, for example, to Judge Nixon, of Salt Lake City, who, in addition to being one of the best informed men in the country on mining laws, is also a man of practical mining experience, one whose judgment could be followed even as to the details of the proper operation of a mine or prospect.

Senator Smoot also explained that the commission should not be limited to metal mining laws. Laws governing coal mines are also in sad need of change he said. He called attention to the fact that Dr. J. A. Holmes, late director of the Bureau of Mines, was very anxious that the laws governing coal mines should be revised along with the mining laws.

Mr. Ingalls called attention to the fact that phosphate and metalliferous minerals often are found together, and that this offered one of the difficulties which would have to be threshed out in the revision of the laws. One of the most famous cases of litigation in the United States, he pointed out, was where a certain kind of mineral in a vein was leased to one person and another mineral in the same vein to another.

Attention also was called to the fact that the tailings of numerous metal mines are said to contain sufficient potash to be available commercially. Chemists are working on the problem of securing potash from this source. Coal and gold are mined from the same shaft in the Transvaal, and other cases were given showing the extreme complexity of the problem which must be laid before the commission.

DIRECTOR SMITH SPEAKS

George Otis Smith, director of the U. S. Geological Survey, was the next speaker. He began his address with this quotation: "Enough, I think, has been adduced to prove that the present law is vicious and inexpedient, that its provisions bear hardly on the mining interests and that it ought to be either repealed or essentially amended." This statement was made by a noted Montana mining engineer in 1868, said Dr. Smith. Even at that time, this authority said the laws resulted in "uncertainty of title, fear of litigation and blackmail."

He used this quotation from Judge Lindley: "In many of its most important features several conflicting opinions have been annunciated by separate courts of equal dignity and equal ability, until we are almost constrained to say that chaos has come again."

Dr. Smith called attention to the fact that these early authorities believed that the only feasible and statesmanlike solution of the mining law situation was the appointment of a commission to secure testimony, to investigate the whole situation, and report to Congress a general mining code.

This proposition, urged so earnestly fifty years ago is before us, unchanged, today, said Dr. Smith.

Attention also was called to the period of marvelous industrial advance, the progress that has resulted in the geology of ore deposits, and in the technology of actual mining and metallurgy, yet, as Dr. Smith pointed out, there has been no change in the laws governing them.

The situation is simply that of an old law broken down at many points under the strain of con-

ditions that could not be foreseen forty or fifty years ago, he said. The waste rock of a few years ago is now ore, and ore deposits of a type not dreamed of by our fathers, pay the dividends of today. The day of large opportunity for mining is not past. It is our recognition of the extent to which our modern civilization rests upon mining that we are asking a modern code to guide the modern utilization of the great modern resources. In the course of his remarks Dr. Smith called attention to the fact that in 1872 the gold output was 40 per cent of the present; silver 30 per cent, lead 8 per cent, zinc 5 per cent, and copper only two and one-half per cent. We not only consume a larger amount of coal, iron and copper and other minerals per capita, but because of modern civilization, which is becoming more and more dependent on mining, it is certainly better to assist than to obstruct.

Following Dr. Smith's talk, Mr. Saunders stated that Dr. Smith held one of the most distinguished positions relating to the mining industry and that he has discharged the duties incumbent upon him in a manner which reflects great honor on the director of the Geological Survey.

CHANNING TALKS

J. Parke Channing, by use of lantern slides demonstrated very effectively the evils of the apex law and of other laws, his talk bearing upon the properties of the Miami Copper Company. The pictures showed views and sections of the Miami, Inspiration, Keystone, Live Oak and other properties. He also called attention to the fact that had it not been for the development of of the steam shovel, by the mining industry, particularly on the Mesabi Iron Range of Minnesota, the Panama Canal could not have been dug in anything like the time in which it was completed.

Following Mr. Channing's talk, Mr. Saunders referred to him as "one of our noted mining engineers."

Mr. Winchell, by the use of maps and glass slides, explained clearly the difficulties that have arisen under the apex law in the Couer d'Alene district.

Mr. Winchell, as chairman of the committee on resolutions, presented the resolutions which later were adopted practically without amendment. The resolutions adopted appear elsewhere.

LEASING PLAN CONDEMNED

During the discussion of the resolutions, the matter of the withdrawal of certain mineral lands in the West again came up, resulting in several heated discussions.

Mr. Macbeath declared that 62 per cent of Idaho had been seized by the Federal Government, and exempted from taxation. He stated that 1,100 miners in Idaho intended to contest the right of the United States to take a portion of their state, and that they had made all arrangements to carry the matter to the Supreme Court of the United States. He said he would have travelled 6,000 miles before returning to his home, to make just this protest before an assemblage of leading mining men.

Mr. Kirby, while expressing full sympathy for the Idaho miners, declared that the object of the meeting was not a discussion of the government's leasing plan, but the threshing out of the very important matter of revision of mineral laws, which had only indirect bearing on the leasing program.

Messrs. Ross and Kellar, both of whom had expressed views decidedly hostile to the withdrawal of mineral lands, spoke in favor of the prohibiting of any discussion of the leasing system.

Among those who registered were:

A. H. Fay, Bureau of Mines, Washington, D. C.; Chas. E. Munroe, George Washington University, Washington, D. C.; Chambers Keller, Homestake Mining Co., Lead, S. D.; Sidney Jennings, U. S. Smelting & Refining Co., New York; David T. Day, Washington, D. C.; Hennen Jennings, Washington, D. C.; Van H. Manning, Bureau of Mines, Washington, D.C.; H. N. Lawrie, Bureau of Mines, Portland, Ore.; N. H. Wheeler, Penn. Bldg., Phila., Pa.; F. C. Schrader, Mining and Metallurgical Society, Washington, D. C.; A. J. Collins, United States Geological Survey, Washington, D. C.; Morton F. Leopold, Bureau of Mines, Washington, D. C.; W. F. Rittman, Bureau of Mines, Pittsburgh, Pa.; W. W. Adams, Bureau of Mines, Washington, D. C.; Robert H. Chapman, Washington, D. C.; Horace V. Winchell, American Institute Mining Engineers, Minneapolis, Minn.; Geo. E. Collins, Colorado Scientific Society, Denver, Colo.; O. P. Hood, Bureau of Mines, Pittsburgh, Pa.; Geo. S. Rice, Bureau of Mines, Pittsburgh, Pa.; Robert B. Henderson, San Francisco, Cal.; John V. Kirchen, Nevada Mine Operators Association, Tonopah, Nev.; G. S. Patterson, Vivian, W. Va.; S. Sanford, Bureau of Mines, Washington, D. C.; E. W. Parker, Wilkes-Barre, Pa.; Oliver Bowles, Washington, D. C.; Chas. A. Davis, Bureau of Mines, Washington D. C.; Geo. Otis Smith, United States Geological Survey, Washington, D. C.; Thomas P. Hard, Geological Survey, Washington, D. C.; Arthur S. Dwight, New York; Fred C. Dezenorf, General Land Office, Washington, D. C.; Goodwin H. Williams, General Land Office, Washington, D. C.; Will A. Clark, Butte, Mont.; C. B. Zabriskie, New York; D. S. Jones, Pacific Coast Borax Co.; Geo. S. Pope, Washington, D. C.; N. H. Darton, United States Geological Survey, Washington, D. C.; Jos. W. Krenthine, Bureau of Mines, Washington, D. C.; J. D. Davis, Bureau of Mines, Washington, D. C.; Chas. W. Flora, General Land Office, Washington, D. C.; Clay Tallman, General Land Office, Washington, D. C.; Addison T. Smith, Twin Falls, Idaho; J. W. Thompson, Washington, D. C.; Union B. White, Washington, D. C.; Geo. B. Bush, Riverside, Cal., Midway Northern Oil Co.; Wm. R. Wheeler, Midwest Oil Co.; San Francisco, Cal.; H. H. Hill, General Land Office, Washington D. C.; Van H. Manning, Bureau of Mines, Washington, D. C.; F. F. Sharpless, 52 Broadway, New York City; S. W. Mudd, Los Angeles, Cal.; John V. N. Dorr, 17 Battery Place, New York City; F. W. Blackford, Columbus, Ohio; E. S. Boalich, Washington, D. C.; Frank A. Ross, Spokane, Wash.; Robt. J. Shields, Georgetown, Idaho; Stuart M. Buck, Bramwell, W. Va.; H. M. Chance, Philadelphia, Pa.; Geo. E. Pettey, Memphis, Tenn.; Robt. H. Richards, Boston, Mass.; H. W. Hardinge, New York City; R. A. F. Penrose, Jr., Philadelphia,

Pa.; W. R. Ingalls, New York City; Gardner F. Williams, Washington, D. C.; Geo. C. Stone, New York City; R. M. Catlin, Franklin, N. J.; A. F. Lucas, Washington, D. C.; H. C. Perkins, Washington, D. C.; Robert Wilson, Pittsburgh, Pa.; Lawrence Addicks, New York City; J. Gordon Hardy, New York City; Gilbert Rigg, New York City; J. Parke Channing, New York City; Walter Douglas, Bisbee, Ariz.; J. A. Van Mater, New York City; Carl Scholz, Chicago, Ill.; Edmund B. Kirby, St. Louis, Mo.; Paul Wooton, Washington, D. C.; J. F. Callbreath, Denver, Colo.; F. L. Ransome, Geological Survey, Washington, D. C.; A. H. Brooks, Geological Survey, Washington, D. C.

PART OF MINING LAW REVISION COMMITTEE IS APPOINTED

In accordance with action taken at the revision of laws meeting held in Washington last month, the following appointments have been made:

By the American Mining Congress—E. B. Kirby, New York; George E. Collins, Denver; Will L. Clarke, Jerome, Ariz.; George Wingfield, Reno, Nev., and Thomas S. Robinson, San Francisco.

By the Mining and Metallurgical Society of America—Horace V. Winchell, Minneapolis; J. Parke Channing, New York; M. L. Requa, San Francisco; R. A. Parker, Denver, and Seeley W. Mudd, Los Angeles.

The American Institute of Mining Engineers has authorized its president to appoint five members to this committee, but they have not been named as yet.

NEW MEXICO'S MINES SHOW INCREASE OF 60 PER CENT

The output of New Mexico mines for eleven months of 1915, with an estimate for December, as reported by the United States Geological Survey, indicates a yield of $1,500,000 in gold, 2,032,000 ounces of silver, 3,951,000 pounds of lead, 72,000,000 pounds of copper, and 24,640,000 pounds of zinc (in terms of spelter and zinc in zinc oxide), as compared with $1,171,696 in gold, 1,777,445 ounces of silver, 1,763,641 pounds of lead, 59,307,925 pounds of copper, and 18,403,392 pounds of zinc, in 1914. These preliminary figures, compiled by Charles W. Henderson, show an increase of $328,000 in gold, 255,000 ounces of silver, 2,186,000 pounds of lead, 12,674,000 pounds of copper, and 6,237,000 pounds of zinc. With higher values for metals, except for silver, the total value was $18,277,000, against $11,049,932 in 1914, an increase of $7,226,660.

The Mogollon district, Socorro County, 80 miles from Silver City (Grant County), continued to be the most productive district in New Mexico in output of gold and silver. The production in 1915 was $512,021 in gold and 1,319,460 ounces of silver, as compared with $629,102 in gold and 1,410,327 ounces of silver in 1914. The Cleaveland and Weatherhead mine and custom mill were idle the entire year, but the Socorro and Ernestine mines and custom mills were operated steadily on ore from each company's mine and from various other properties in the district. All the ore is milled in the district by concentration, sliming, and agitation and percolation in cyanide solution, the bulk of the product being cyanide precipitates, the balance being high-grade gold-silver concentrates. There was a smaller quantity of concentrates shipped in 1915 than in 1914. An important producer of gold was the Elizabethtown district, Colfax County, there being a small quantity of placer gold and an important quantity of high-grade metallic gold, gold bullion, and concentrates from the Aztec mine at Baldy.

COCHITI DISTRICT IMPORTANT

Another important district was the Cochiti (Bland) district, Sandoval County, inactive from 1904 to 1914, but with a record from 1894 to 1904 of a production of $695,000 in gold and $345,000 in silver. The 100-ton cyanidation plant of the Cossak Company, which commenced operations in September, 1914, was operated nearly all the year 1915 with a very considerable output of silver-gold cyanide precipitates. Continuous output of gold bullion was made from the amalgamation mill on the North and South Homestake mines, at Whiteoaks, Lincoln County. This district has yielded a large quantity of gold. While the yield of metallic gold in 1915 from the Pinos Altos district was not equal to that of 1914, some high-grade shipments were made early in the year, and work was active in the district on the baser metals. The Lordsburg district, Grant County, nearly doubled its shipments of siliceous gold and silver bearing copper and dry ores from fissure veins. The yield of this district in 1914 was $101,080 in gold, 232,647 ounces of silver, and 2,614,674 pounds of copper. A small yield of gold was made from the Gold Hill district, north of Lordsburg. With an increased output of concentrates, the small gold content of the concentrates of the Chino Copper Company in amounts sufficiently large in 1914 to be credited under their smelting contract with 2.71 cents per ton of original crude ore, or 0.1 cent per pound of copper produced, showed an increase. The reopening of the mines and matte smelter of the Santa Fe Gold and Copper Company, at San Pedro, Santa Fe County, in May, 1915, added a considerable quantity of gold to the New Mexico yield. Increased shipments of gold-copper ores from the Jarilla district, Otero County, also contributed to the gold increase.

INCREASED YIELD OF COPPER

Copper has been an important metal in the production of New Mexico. The output from 1845 to 1910 was 92,323,163 pounds, and the total output to the end of 1915 was 318,027,798 pounds. Since 1910 the increased production was due principally to the activity of the Chino Copper Company, which mines with steam shovels a large acreage of low-grade copper deposits at Santa Rita and mills the

ore at Hurley in a wet-concentration-flotation plant of five sections. During 1914, this plant treated 6,300 tons a day, calculated on the actual running time, and in 1915 a larger daily tonnage was treated. The gross output in 1914 was 56,841,977 pounds. In 1915 the gross yield for the first three quarters was 48,733,648 pounds and the yield (partly estimated) for the fourth quarter was 20,641,000, a total for the year of about 69,375,000 pounds. During the third quarter an average of 7,504 tons a day was treated, the highest average treated by the mill since the beginning of operations. The yield of copper from the Lordsburg district was nearly doubled, and Oro Grande also contributed an increased yield. The resumption of operations in May, 1915, of the Santa Fe Gold and Copper Company's mines and 125-ton matting plant at San Pedro, Santa Fe County (operated only one month in 1914), added a large quantity of copper to the output. The Burro Mountain Copper Company's new 1,000-ton mill in the Burro Mountain district was operated only part of the time, but development of the mines continued on a large scale. A large tonnage of low-grade copper ore with calcite gangue was shipped from the Apache mine, Hachita. A considerable tonnage of copper ore was shipped from the Organ district, Dona Ana County.

The yield of lead showed an appreciable increase. Lead ores were shipped from the Cooks Peak district, Luna County, from the Organ district, Dona Ana County, and from the Magdalena district, Socorro County.

Heavily increased shipments of zinc carbonate and sulphide ores and zinc sulphide concentrates were made from New Mexico in 1915. At Kelly, Socorro County, the principal producing mines were the Kelly, Graphic, and Juanita. The Ozark mill was operated continuously on the sulphide ores from the Graphic, and the Kelly magnetic mill was completed. At Hanover, Grant County, zinc carbonate ores were shipped from the Hanover and other mines, and the building of a mill for the treatment of sulphide ores at Hanover was commenced. Both zinc carbonate and sulphide ores were shipped from the Cooks Peak district, and carbonate ores from the Florida and Tres Hermanas districts, Luna County. Zinc concentrates were shipped from the wet-concentration-electrostatic mill of the Pinos Altos M. & M. Co. The new magnetic separation mill at the Cleveland mine, at Pinos Altos, was completed and set in operation. A car of zinc ore was shipped from the Hermosa district, Sierra County. The production of zinc ore and concentrates from New Mexico was 39,970 tons of 36.3 per cent, as compared with 29,459 tons of 37.53 per cent zinc in 1914.

CANADIAN MINES CHECK NICKEL DEVELOPMENT HERE

The only possible cobalt-producing properties known to the Geological Survey are those of the Comer Mines Co., Prairie City, Ore., and certain properties at Fredericktown, Mo.

At Fredericktown nickel and cobalt bearing sulphides are separated from galena. At one time an attempt was made to make nickel and cobalt from these concentrates, but the works were closed down and nothing has been done with them for a number of years.

The Key West Co., Bunkerville, Nev., has deposits which carry some nickel. Nickel deposits also exist forty-five miles southeast of Lovelock, Nev. These were owned by Fred Lovelock, who is now deceased, and it is understood that they are now owned by W. J. Flick, Lovelock, Nev., and others. Deposits of nickel silicate exist at Piney Mountain near Riddle, Douglas County, Ore. C. W. Clapp of the Nickel Mines and Smelting Co., Portland, Ore., is believed to be interested in this deposit. Nickel mining was at one time prosecuted at Gap, Pa., but no work has been done since the development of the Sudbury mines in Canada which makes the development of nickel in this country very difficult. The Gap mines are thought to be owned by the Wharton estate.

Withdrawals and Restorations

Summary of principal withdrawals and restorations during the period March 4, 1913, to November 30, 1915 (in acres):

	Outstanding withdrawn Mar. 4, 1913.	Withdrawn during period.	Restored during period.	Outstanding withdrawn Nov. 30, 1915.
Coal	65,410,464	436,726	17,402,697	48,444,493
Oil and gas	4,817,706	550,580	538,619	4,829,667
Phosphate	3,367,378	443,972	1,151,214	2,660,136
Potash	133,829	211,384	3,200	342,013
Power site	1,857,258	655,559	165,266	2,347,551
Public water	86,216	98,431	2,702	181,945
Totals	75,672,851	2,396,652	19,263,698	58,805,805

(Continued from page 27)

share of this country's contribution to the world's needs and there is evidence that under the present abnormal conditions our mineral exports are winning for the United States of America a new and larger place in the world market.

In the third of a century just past the exports of foodstuffs, while showing an actual increase in amount, have fallen from 55 to 21 per cent of the total exports, and there has been a corresponding gain in the export of manufactures, from 24 to 58 per cent. Again, by comparing the exports of 1880 with those of 1913, the latest year unaffected by abnormal conditions, it is found that the value of exports of mineral products and manufactures thereof has increased from less than 4 per cent to 42 per cent of the total exports, an increase amounting to more than one and one-half billion dollars.

DEVELOPMENT RAPID

The epoch of rapid growth of the mineral industry in the United States began about thirty-five years ago, and this third of a century has witnessed wonderful development. Clarence King, in the first administrative report of the United States Geological Survey, analyzed the situation in 1879 in these words: "We are yet at the very threshold of the industrial life of the republic," and looking forward, he added: "The mineral industries will soon reach an annual yield of a thousand million dollars of value." May I now remind you that five times already our country's annual mineral production has exceeded two thousand millions of dollars?

For this period of development since 1880 statistics of the mineral production are available, so that the extent of the expansion of the industry can be summed up in the statement that the value of the output has increased nearly seven-fold, while our population has less than doubled. If we compare directly the output per capita of population the record of increase in the output of the more important mineral products becomes really instructive or even inspiring. Thus in this period of thirty-three years, the production and consumption of coal per capita have increased from less than a ton and a half to nearly six tons—an increase of 357 per cent. Similarly, the per capita production of iron ore increased 337 per cent; petroleum, 391 per cent; copper, 1,200 per cent; cement, 2,087 per cent; gold and silver increased only 23 and 22 per cent respectively, but lead increased 125 per cent, and zinc, 638 per cent. This is a record of which mining men of this generation may be proud.

COMPARED WITH AGRICULTURE

If statistics for the more important agricultural products are studied in a similar manner, it is found that the total increase during the same period has not much more than equaled the growth in population. This is true of the two leading grains, corn and wheat, the one having somewhat more than doubled and the other not quite doubled in the third of a century, so that the production per capita shows only a small percentage of increase. In cotton the gross increase has been larger, approaching 130 per cent, but wool has failed to increase as rapidly as the population. It is only sugar that shows an increase, both in domestic production and in consumption, at all comparable with that of most of the minerals mentioned, the per capita increase being 394 per cent, or about the same as that in the other carbon compounds, coal and petroleum.

SOUTH SHOWS UP WELL

Especially notable in this period of phenomenally rapid strides has been the industrial development of the New South, which has more than kept pace with the country as a whole. In 1882 the Southern States produced only 8 per cent of the mineral output of the country; in 1890, 14 per cent; in 1900, 16 per cent; in 1910, 19 per cent, and in 1914 their output was 22 per cent of the total mineral production. Thus the South, with steady gains, has been utilizing that share of industrial opportunity afforded by its varied wealth of mineral.

Dr. Chance[5] lately remarked that what is sometimes called engineering efficiency, is "more broadly described by the term conservation of labor," and so in any discussion of the national significance of advances in engineering it is important to realize that the object of the engineering sciences is simply to win the largest results with the least possible expenditure of labor. If a poet ever seeks a theme in the story of the mines, he should write the epic of this struggle of man with mountain masses, where victory comes only through the harnessing of Titan power. Today, huge steam shovels mine iron and copper and coal, and giant electric dredges win the gold from gravels that are too poor to work by less efficient methods.

ELOQUENT FIGURES

Thus it follows that the most gratifying phase of this mining development is the marked increase in man's productive capacity. Let us take the 20-year period, 1889-1909, and analyze the coal-mining record. Roughly stated, the number of mine workers has a little more than doubled in that period, the output of coal has more than trebled, and the capital investment has more nearly quadrupled. The exact percentages of increase are 123 per cent in employes, 226 per cent in production, 252 per cent in capital. Stated in terms of efficiency, the mine worker increased his individual output from 471 to 691 tons a year, while the average annual output per dollar of capital remained nearly the same, about two-fifths of a ton, the increase in capitalization per ton of output being less than 8 per cent.

[5]Chance, H. M., address at Pennsylvania State College, Nov. 5, 1915.

IRON'S GOOD SHOWING

In iron mining the record for the same period is even more striking; the number of miners increased less than one-half, the capitalization nearly trebled, and the output nearly quadrupled. In the iron mines, then, both labor and capital became more efficient, the output per miner increasing from 385 to 995 tons and the production per dollar of capital from one-seventh to one-sixth of a ton, and this improvement did not halt with the census year of 1909. All this tells the story of steadily increasing efficiency of mine worker, mine equipment, and mining methods—that is, of the contributions by labor, capital, and engineering.

The human aspect of this picture of change in the mining industry is full of encouragement to every one interested in the welfare of his fellow citizens. That type of industry is to be desired which employs a maximum of skilled labor and a minimum of "muckers." The labor of any country is most benefited by the export of finished products rather than crude ore and by the import of raw materials rather than manufactures. Looking at the question from the standpoint of the United States, it is the product of American labor rather than the bounty of our natural resources that should go into the world's markets, for betterment of industrial conditions can come best through expansion of manufacturing. The increase in the element of labor in the product exported will mean that we are not bartering away our heritage of natural resources, but rather that we are using these resources as a basis simply for the expenditures of labor, which renews itself.

DIVERSITY INCREASING

Confidence in the future of the mineral industry may be strengthened by even a passing glance at its increasing diversity. The statistics of mineral production in the United States in 1880 covered fifty-one mineral products, whereas the table of production for 1914 contains no less than ninety-five items, and the accompanying report mentions eighty-nine other minor products. Since 1880 the baser metals have come to the front, and indeed the nonmetals once of subordinate rank now exceed in total value the metals. Moreover, the small increase in the output of gold and silver has been made in part with both these noble metals in the rôle of by-products from copper and lead mines.

BY-PRODUCTS

The subject of by-products stimulates inspring thought. Under the exceptional demands of the year just past, sulphuric acid, which has been a source of embarrassment to the smelter operator, has become a commodity of great price. Dr. Douglas, indeed, in observing the advances in blast-furnace operation, once raised the question whether eventually pig iron will be "the principal object of manufacture or one of the by-products." In the case of that highly useful metal, platinum, of which the United States, unfortunately, has an insufficient supply—the amount won in the refining of gold bullion and copper matte of domestic origin is four-fold the small quantity obtained from our platinum ores and concentrates. The metals selenium and tellurium are produced in the electrolytic refining of copper or may be saved from smelter fumes, and if uses are found for these metals considerable demand can be met by the supply from these sources.[6] Gallium, hitherto hardly more than a curiosity among metals, is now recovered as a by-product in zinc redistillation in quantities sufficient for a real test of its possible uses.

BETTER LIVING CONDITIONS

Along with all this marvelous increase in material production, it is gratifying to note again that most of the development has been of the type that betters the conditions of living. During the period of marked growth, metal mining, for instance, has passed from the exploitation of bonanzas to the working of low-grade deposits, a change which, as Dr. Raymond has remarked, by creating larger and more permanent communities has laid safe foundations of civilization and progress. Thus does the utilization of our mineral resources measure up to the higher standard of public service by building homes and giving all the workers a better opportunity to live a full life. This is the ideal of democracy.

The relation of mining to other industries deserves a passing word. Speaking of the era of mineral exploration that began with the finding of gold in California and Australia, Mr. Rickard[7] has termed that discovery "the prelude to a world-wide migration, an enormous expansion of trade, a tremendous advance in the arts of life, and the spread of industry to the waste places of the earth." The miner has ever been the pioneer of civilization. The history of the winning of our own West has been in large measure the story of the rancher that followed the miner, and the railroad builder that followed both. This vital interrelation between mining and agriculture and transportation continues to this day.

CONTRIBUTE TO DEVELOPMENT

Both the past record and the present status of the mining industry show that the mineral resources of the United States possess largest public value in their indirect contribution to national development. Even in the case of certain mineral deposits in public ownership the substitution of a leasehold system for the other form of mineral-land tenure may better be sought for the purpose of insuring development and beneficial control of operation than with an eye single to the amount of royalty possible from production under the lease. In fact, it may be easily shown that the State or

[6]Hess, F. L., U. S. Geol. Survey Mineral Resources, 1914, pt. 1, 1916.
[7]Address at Columbia School of Mines, May 29, 1914.

nation will not be so much benefited through a direct royalty as through the indirect revenue gained by the establishment of a new industry, and by its influence on the neighboring agricultural areas and the transportation systems to which the new traffic is tributary. The value of the direct and indirect benefits cannot easily be appraised and compared, for prosperity cannot be weighed.

TONNAGE TAX INEQUITABLE

The difficulties as well as the inequities that would attend the imposition of a tonnage tax or even a tax on gross proceeds may be illustrated from current mining statistics. The net proceeds per ton of ore produced in one mine may exceed the gross value per ton of the ore produced in another; and in still another mine with even richer ore, heavy costs may leave little or no margin of profit. Whatever the basis of the public's claim for revenue, the determination of a proper royalty presents great practical difficulties, yet, by imposing a fair tax on earnings, similar to the present corporation tax, the desired results are secured. If taken in large units, the income from mining shows a fairly definite percentage on output. Thus in 1913 the dividends paid by the successful metal mines in Utah[8] amounted to five and one-half million dollars, or about one-eighth of the gross output of all the metal mines in that State. Or, taking a longer period, the aggregate dividends paid by mining companies of the Tintic district in Utah in about forty years are estimated at twenty-seven and one-half million dollars, or more than one-sixth of the total production for that period.[9] Other districts might be cited where the dividends paid are at the rate of $3 or $6 or more per ton of ore mined, yet in equally successful mines the large dividends paid may represent only 50 cents per ton. However great may be the variation in earnings and losses, as figured on the tonnage basis, the aggregate dividends distributed are large and represent on the average an appreciable fraction of the gross value of the output. And under existing laws these profits of mining pay tribute to the nation's need.

SWELL INCOME TAX

The importance of the income tax now paid by the mining corporations may be shown by the fact that under the market conditions of the year just past, several of the largest copper companies will probably pay into the national treasury something approaching a mill on every pound of copper sold or perhaps $2 a ton. For this exceptional year the Federal corporation tax on copper mines alone may total a million dollars. In a State where net proceeds are taxed not less than half a million dollars of State revenue are expected from two large mininig companies.

TAXATION DISTINCTIONS

Whether the mineral resources are in private or in public ownership, even a hasty consideration of the subject suggests the need of making a distinction between minerals in which the domestic and foreign competition is sharp and those in which the margin of profit is so large that the tax will neither affect the nation's ability to compete in the world market nor increase the price to the domestic consumer. In short, the public's direct share of the proceeds from mineral resources must not be so great as to affect unfavorably labor's opportunity or capital's incentive.

Because of the essential relation between the mineral resources of a country and its prosperity, both national and international, there rests upon the public a continuing obligation to the mining industry. The modern doctrine of conservation was well expressed by Dr. Raymond nearly 50 years ago in his first report on Mineral Resources.[10]

"In view of these peculiar relations of mining, it is evident that governments are in a certain sense trustees of the wealth stored in the mineral deposits of their realms——trustees for succeeding generations of their own citizens and for the world at large. It is not a matter of indifference to the citizens of this country whether our mining fields be ravaged and exhausted in one or even five centuries, when they might last a score."

MUST CHECK WASTE

The governmental duty to the mining industry first of all is to promote use without waste. The educational and investigative work of the Government scientific bureaus is the nation's contribution, and in this application of science to the promotion of the general welfare of the industry, the chemist and the engineer, the geologist and the metallurgist cooperate; and the large service rendered through the collection and publication of scientific statistics of mineral production and of mine accidents has won from the industry deserved recognition. The Government aid extended to any industry may better take the form of real leadership in applied science than of ingenious schemes of artificial stimulation. W. R. Whitney[11] has accurately stated this relation: "Search for new knowledge is the insurance for the future of the industries."

Equally important, if not indeed altogether imperative at this time, is the need that the public support only such proposed legislation as may promise to encourage engineering efficiency in the mining industry. The public interest requires that the idea of the Government as a trustee be kept in mind, yet it is no less essential that the trustee fully appreciate just to what extent individual initiative, and especially corporate effort, are attaining some of the very ideals desired in the public interest.

[8]Heikes, V. C., U. S. Geol. Survey Mineral Resources, 1913, pt. 1, p. 374, 1914.
[9]Heikes, V. C., op. cit., p. 393.
[10]Raymond, R. W., Mineral Resources of the States and Territories, p. 176, 1869.
[11]Am. Acad. Polit. and Soc. Science Annals, May, 1915, p. 94.

By its constructive effort the large unit in production—"big business," if you please—is winning such victories in the largest and wisest use of our mineral resources that its public-service nature is becoming apparent. Public regulation of private operation is the people's safeguard, but regulation need not be active as long as these great industrial units are seeking larger profits, not by artificially curtailing production or raising prices, but rather by eliminating waste and lowering costs. The larger dividends paid by mining companies today are won not so much through monopolistic control of virgin bonanzas, as through the possession of tracts of mineral land big enough to warrant great expenditures of engineering skill. It is the day of large returns from lean ores. The net result of this type of exploitation is to increase, rather than to decrease, the nation's resources. Even concerning an expendible resource, it is in a sense true that "there is that scattereth and yet increaseth."

BIG COPPER RESERVE

Seven years ago Professor Lindgren, in discussing the visible reserves of copper ore in the United States, itemized the estimates for four districts in three States, for which he obtained a total of about 160 million tons of developed reserves, and his comment[12] was, "Each year will, however, surely find extensions of reserves added to those already discovered." Now, indeed, these four districts have known ore reserves amounting to over 600 million tons, not to mention 60 million tons already mined, mostly in these few years. Nor is this gratifying increase due alone to the exploratory work of the mining engineer. Since 1906 the average recovery from United States copper ores has decreased from 50 pounds of metal per ton to 32 pounds.[13] This change in quality of ores mined and treated is due more to the improvement of methods than to the exhaustion of the richer deposits. The continued lowering of the cost of mining and treating a ton of ore has made possible this reduction in the grade of ore that can be profitably handled, and the result is a corresponding increase in the copper ore reserves of the country. Thus do the engineers and metallurgists work together to place the copper industry upon a more lasting foundation, and with this constant improvement in mining methods and mill and smelter practice, nothing less than an annual inventory of the nation's mineral resources can keep the people truly informed.

COAL RESERVES

The only increases in known mineral reserves comparable with that credited to the copper companies are the equally important changes in the estimates of this country's phosphate and coal reserve. The field work done by the United States Geological Survey during the last six years has increased the known reserves of phosphate rock in the publicly owned lands of the Western States from a few hundred million tons to more than five billion tons. As for coal, the quantity of easily accessible anthracite and bituminous coal exceeds the estimated tonnage in 1909[14] by 440 billion tons, an increase of nearly 30 per cent. This change in Mr. Campbell's estimates is due almost wholly to the work done in the intervening few years under his direction by Government geologists in classifying and valuing public coal lands.

The day of large opportunity for both exploration and investigation of the mineral resources of this country is not past. In this time of adjustment to special demands it is easy to be optimistic regarding future advances along all the engineering lines leading to the full utilization of our mineral wealth

The recognition of the extent to which modern civilization rests upon mining and the realization of the consequent need of promoting efficiency in mineral production will insure the placing of the proper estimate of value on the public interest in mineral resources. As the nation's future welfare depends on the continued productivity of our mines, it follows that even if the nation's mineral wealth does greatly exceed that of any other country, the public interest requires that no part of it be squandered.

AMERICAN INDUSTRIES HURT BY PLATINUM EMBARGO

A serious condition for the consumers of platinum in the United States has been precipitated by the action of Great Britain in declaring an embargo on the metal, according to experts at the United States Geological Survey. Not only has the price of platinum become prohibitive, but it is almost unobtainable in any equantity at the exorbitant rates being asked.

Some good is resulting from this condition, however, due to the stimulation which is given prospecting as a result of the very high prices. The benefits which may be derived from this, however, is nothing to compare to the economic loss which is resulting, as there can be no reasonable hope of developing platinum in quantity in the United States.

The manufacture of platinum jewelry is practically at a standstill. The use of this metal in the arts has been discontinued practically. Dentists are using platinum scrap and are substituting other metals wherever possible.

The development of the Rambler mine in Albany County, Wyoming, has been hastened greatly by the high price of platinum. It is expected that this property will produce this year. The platinum in this mine is combined with copper and silver.

[12]Lindgren, Waldemar, Papers on the conservation of mineral resources; resources of the United States in gold, silver, copper, lead and zinc; U. S. Geol. Survey Bull. 394, p. 142, 1909.
[13]Butler, B. S., U. S. Geol. Survey Mineral Resources, 1914, vol. I, p. 555, 1915.
[14]Campbell, M. R., Papers on the conservation of mineral resources, coal fields of the United States; U. S. Geol. Survey Bull. 394, p. 8, 1909.

Mineral Land Decisions

Instructions have been issued to the commissioner of the General Land Office in the matter of exchange Indian allotments on the Fort Berthold Reservation of North Dakota. The commissioner has been ordered to proceed with the allotments of these Indian lands regardless of their coal character. The trust patents covering the original allotments were surrendered and properly liquidated for cancellation. The commissioner was directed to issue new patents of like form. Trust patents, however, were not issued because of the reported coal character of a large part of the land.

The director of the Geological Survey on April 17, 1911, submitted to the Indian office his report showing that the tracts which include many of the exchange allotments were coal lands. More than 2,000 acres show the presence of coal. On the strength of this report a withdrawal order was signed by the Secretary of the Interior on June 27, 1911.

An act passed August 3, 1914, provides for a classification and appraisal of the surface of the reserved coal area of the reservation and to sell and dispose of it with a reservation of the coal. Provision was also made for the disposal of the reserved coal deposits.

After the passage of the act, and before the coal classification and withdrawal were made, many allotments were filed in the coal area.

On the occasion of a similar question on the Fort Peck Indian Reservation the commissioner of the General Land Office was advised as follows:

"In view of the fact that the allotments were made prior to the time when they were known to be coal in character, and of the departmental decision in question, it would appear that patents should be issued in regular order upon this allotment in the absence of other objections."

The Fort Berthold allotments were made in the fall prior to the act of June 1, 1910, and were not pursuant thereto. They were scheduled regularly and submitted thereafter to the department for approval and actually were approved for trust patent by the department, all prior to the report and classification made by the Geological Survey, and prior to the withdrawal order which followed.

As a consequence, the secretary has ruled that these allotments, and the approval granted, should stand and be held intact notwithstanding the subsequent classification and withdrawal, and that in the absence of other objections the proper trust patents should be issued.

COAL APPLICATIONS REJECTED

With the exception of a modification affecting one claim, the decision of the commissioner of the General Land Office rejecting important coal-land applications of the Alaska Petroleum & Coal Co., has been affirmed by the Secretary of the Interior.

The properties involved are in the Juneau land district of Alaska. There are twelve coal claims claimed by the company.

Charges filed by the commissioner of the General Land Office are as follows:

"1. That the claimants did not make their respective locations and filings for their own exclusively individual use and benefit; but that they and each and every one of them prior to making said locations and filings on and for the lands involved, entered into an agreement or understanding with each and every other one of them whereby it was agreed and understood that after obtaining patent for said lands that they would consolidate and combine and hold the lands embraced in the locations and filings for their joint use and benefit. This agreement was carried out in the making of the locations and findings.

"2. The claimants did not locate in good faith all the lands embraced in their findings with the intent that the legal title to the lands covered by the filings should be acquired pursuant to the laws of the United States governing the entry, sale or disposition of public lands available for the coal deposits contained therein, for the separate and several uses and benefits of the individual claimants, but each of said locations was made pursuant, as above, to the unlawful purpose that the title acquired should inure to the use and benefit in equal measure to the entryman, and to each and every one of the several other persons by whom coal declaratory statements, mentioned above, were made, or to the use and benefit of an association or corporation by them formed or members and stockholders by themselves or an association with such other persons as they might attempt or who might secure entries therein.

"3. That the locators or claimants of the several tracts and parcels of land covered by and embraced within the coal declaratory statements, and did not prior to making such location or at any other time thereafter and prior to filing notices of said location, open or improve any mine or mines of coal in and upon any of the said tracts of land."

The charges were denied. Testimony was taken and the legal officers rendered a decision holding that the Government had conclusively established the truth of charges No. 1 and No. 2, and a portion of No. 3.

Upon appeal from this action the decision of the legal officers was modified by the commissioner to the extent that it was held that the charges had been sustained as to all the claims and that the application in this entry should be rejected. Further appeal was taken to the Secretary of the Interior.

A study of the record convinced the department that charges No. 1 and No. 2 had been sustained and the Fremont claim, one of the group of twelve, was thought to have been handled in a legal manner. After extensive examination of this feature of the case, the Secretary overruled the commissioner in his decision that all the applications should be rejected.

As to the Fremont claim, the department fails to find any sufficient evidence of fraud or proof that the claim was not located for the individual use and benefit of the locator, while a mine of coal had been opened and improved prior to withdrawal, and such development continued diligently thereafter. Accordingly, in the absence of other objection, patent has been ordered issued in the Fremont claim, but application is denied on all the other claims and locations involved in the case.

INCREASES RATE.

Coal land covered by the appeal of Effie A. Hard must be paid for at the rate of $20 per acre, according to a ruling by the Secretary of the Interior in which he upholds the previous decision of the commissioner of the General Land Office.

The tract in question is in the Vancouver land district of Washington. The land is embraced in the executive coal land withdrawal of July 7, 1910, and of the departmental withdrawal of December 17, 1906. The executive withdrawal remained effective until December 2, 1913, when it was revoked. On January 31, 1913, Effie Hard filed a coal declaratory statement for the tract, alleging possession thereof February 15, 1904, and the opening and improving of a mine of coal thereon October 25, 1907. This filing, however, was rejected by the commissioner's decision of April 24, 1913, for the reason that the withdrawal of the land made it not subject to such filing.

Subsequently, the claimant filed application to purchase the tract, alleging the performance of certain work on the claim at a cost of $700. She announced her intention of opening and improving a mine of coal upon the property. It was alleged that the work was commenced in 1902 and continued during various years down to and including 1913. This work, it was also stated, resulted in the opening and improving of two mines in the tract. The affidavit was made on the usual form, but was amended so as to state that no portion of the land was wholly or in part within fifteen miles of a completed railroad. Payment for the land was made in the sum of $1,600, or at the rate of $10 per acre, and final certificate of entry was issued.

Upon consideration of the entry the commissioner found that at the date of the entry the land was within less than fifteen miles of a completed railroad, and demanded that an additional payment of $10 per acre should be made under penalty of suffering the cancellation of the entry.

The claimant contends that inasmuch as she has shown that there was no completed railroad within fifteen miles of the land, she initiated a claim to the tract by opening and improving the mine, she should be held to be within the terms of the coal-land regulations. She further urges that the land having been unsurveyed at the time she initiated her claim thereto, that it is the right of the claimant to make payment of the land in accordance with the conditions existing at the time of the initiation of the claim rather than with respect to conditions prevailing at the date of entry.

The law in this regard, however, reads as follows:

"Every person shall, upon application to the register of the proper land office, have the right to enter by legal subdivisions any quantity of vacant coal lands upon payment to the receiver of not less than $10 per acre for such lands where the same shall be situated more than 15 miles from any completed railroad and not less than $20 per acre for such lands as shall be within fifteen miles of such road."

This law is amended and the language of the amendment standing alone seems to support the claimant's views. It was, nevertheless, intended by the department to apply only to coal lands whose price, between the date of the filing of an application or the initiation of a claim thereto and the time of the completion of the proceedings, had been increased by departmental appraisals or reappraisals. Not only was the amendment not intended to apply to a case like this one which is automatically under the express provisions of the statute included above. The secretary held that no reason existed for changing the decision of the commissioner and the land must be paid for at the rate of $20 per acre.

CALIFORNIA IS ONLY PRODUCER OF CHROMITE

California is practically the only producer of chromite in the United States. The principal mine is near Dunsmuir, Cal., and owned by J. B. Huffard, Mills Building, San Francisco, Cal., who controls several other chromite mines in the State.

Chromite is being produced also in Fresno County, Cal., by the Levansaler-Speir Corporation, 251 Monadnock Building, San Francisco, Cal., and in Nevada County by the Zenith Iron Co., near Forbestown, Cal. Besides these, small quantities of chromite have been produced from sand that has been washed in the vicinity of Baltimore, Md.

Operating New Zinc Plant

An experimental zinc plant is being operated by the Anaconda Copper Mining Co. As the work being done is purely of an experimental nature, no information as to results is being given out.

Current Federal Legislation

Thus far 9,619 bills have been introduced in Congress—2,845 in the Senate, and 6,774 in the House of Representatives.

A digest follows of such of these bills as are of most interest to mining men. Effort will be made to furnish the full text of any of these bills to any who may make request for same to the American Mining Congress.

SENATE BILLS

S. 44, by Senator Smoot, provides for the acquisition by a State of any lands therein which are chiefly valuable for the development of water power, and that any State desiring to avail itself of the provisions of the act shall through its regularly created board, commission or other regularly constituted public authority, vested with power to regulate and control rates and service of public utility corporations, file with the Secretary of the Interior an application setting forth the description of the lands sought, accompanied by a map, together with proof that the lands are chiefly valuable for the development of water power. It is provided that this act shall apply to any part of the public lands of the United States, reserved or unreserved, including national forests, national monuments and Indian reservations, provided it does not interfere with the purpose for which the same are created.

S. 50, by Senator Smoot, provides for the application of a portion of the proceeds of the sales of public lands to the endowment of schools or departments of mines and mining. Mr. Smoot asks that $5,000 be appropriated from the sale of lands the first year, $10,000 the second year, $15,000 the third year, $20,000 the fourth year, and for each succeeding year the sum of $25,000, to be used for the establishment and maintenance, under control of the Secretary of the Interior, of a school or department of instruction in mines and mining. If in any State or territory there is already established a school of mines, then the money appropriated shall go to this school. The money so appropriated shall be expended only for instruction, research and experiment in mining, mining engineering, ore treatment, metallurgy, assaying and chemistry and geology. If any State has no school or department of instruction in mines or mining, then the Secretary of the Interior shall designate some accessible and convenient place where the school of mines shall be located.

S. 52, by Senator Smoot, provides for a commission to codify and suggest amendments to the general mining laws. A full discussion of this bill, as well as that of Representative Taylor, appears in this issue in the account of the revision of mining laws meeting. (Referred to committee on Mines and Mining and favorably reported December 16, 1915.)

S. 64, by Senator Smoot. This bill provides for an increased annual appropriation for agricultural experiment stations, to be used in researches in home economics.

S. 593, by Senator Gronna. This bill provides for the disposal of coal or coal lands and provides that such leases shall fix the maximum prices at which coal shall be sold to the public and that any act in restraint of trade shall work a forfeiture of the lease.

S. 594, by Senator Gronna, provides for the classification of the public lands of the United States, and that all patents hereafter granted under any of the public land laws of the United States shall contain an express reservation of all deposits of phosphate, oil, asphaltum, natural gas, coal, lignite or associated minerals.

S. 597, by Senator Gronna, provides for the leasing of phosphate, oil, asphaltum or natural gas lands.

S. 600, by Senator Gronna provides for the granting of permits, the use and occupation of lands of the United States for the development of water power under the provisions of the act of February 16, 1901.

S. 673, by Senator Clapp, defines unfair discrimination and makes same unlawful.

S. 682, by Senator Poindexter, provides for mineral entries on lands in Indian reservations, with the provision that each producing mine developed shall be subject to a levy by the Secretary of the Interior of a reasonable royalty. Funds thus collected are to be paid into the tribal funds of the tribe on whose reservation the mineral deposit was found.

S. 775, by Senator Walsh. This bill provides that all lands belonging to the United States containing deposits of carnotite, pitchblende or other ore containing radium in sufficient quantity for extraction, shall be subject to occupation and purchase under the mining laws, providing the United States shall have the exclusive right to purchase such ores at the market value of same when removed, and also in case of failure of the occupant to develop and mine such ores with reasonable diligence, that the United States shall have the right to mine the ore, paying to the owner the market value thereof, less the cost of mining. It further provides that in case the United States shall fail to purchase any such ores upon tender of same in carload lots at any railroad station, the exclusive right to purchase or mine the ore upon said claim shall terminate. The bill further provides that the disposition of radium bearing ores located under the provisions of this act shall be unlawful and subject the owner upon conviction, to a fine of not less than twice the value of the ore so disposed of. The bill also provides an appropriation of $150,000 for the erection of a radium extraction plant, and $300,000 for the expense connected with the purchase and treatment of radium bearing ore during the first year. The bill further provides that radium-bearing lands within Indian reservations shall be subject to the same rule, royalties to be paid the Indians entitled to occupy such reservation.

S. 777, by Senator Walsh, provides for the encouragement and promotion of the mining of coal, phosphate, oil, gas, and sodium on the public domain. *Coal*—Deposits of coal on land owned by the United States, outside of Alaska may be acquired under the provisions of the existing law (see 2347 to 2352, U. S. Revised Statutes), or same may be leased by the Secretary of the Interior through competitive bidding or such other methods as he may adopt, in block or tracts of 40 acres each, or multiples thereof, and in such form as in the opinion of the Secretary of the Interior will permit the most economical mining. In no case may the tracts exceed 2,500 acres. No tract is to exceed in length two and one-half times its width. For the privilege of mining and disposing of the coal the lessee shall pay to the United States such royalties as may be specified which shall not be less than 2 cents per ton in addition to the rental of 25 cents per acre for the land for the first year, 50 cents per acre for the second and third years and $1 per acre for each year thereafter. Leases are to be for indeterminate periods upon condition of continued operation. Exception is made when operation is interrupted by strikes or other matters outside the power of the lessee. Each twenty years the lease is to be subject to readjustment. *Phosphates*—Leases of phosphate land are not to exceed 2,560 acres. The lessee is to pay to the United States royalties not to be less than 2 per cent of the gross value of the output of phosphate at the point of production. Annual rental is to be charged at the rate of $1 per acre per year. *Oil and Gas.*—The Secretary of the Interior is authorized to grant a prospecting permit giving exclusive right for a period not exceeding two years, to search for oil or gas upon a tract not exceeding 640 acres, if the tract is within 50 miles of a producing well. If it is situated over 50 miles from a producing well the extent of the permit may be increased to 2,560 acres. Mining operations must begin

within four months from the date of the permit. After one year a well must have been driven to a depth of at least 500 feet. At the end of two years a well must have been driven to a depth of 2,000 feet. On establishing the occurrence of oil or gas in valuable amounts the permittee is to be entitled to patent one-fourth of the land covered in his pospecting permit. *Potassium or sodium*—The prospecting permit on lands containing chlorides, sulphates, carbonates, borates or nitrates of potassium or sodium may cover 2,560 acres. On proving that valuable deposits have been discovered the permittee is entitled to patent 160 acres of land embraced in the prospecting permit. The remainder of the tract covered by the permit is to be subject to lease by the Secretary of the Interior.

S. 785, by Senator Walsh. This bill provides for the leasing of any unpatented oil and gas lands included in any order of withdrawal, upon which oil or gas has been discovered, was being produced, or upon which drilling operations were in actual progress January 1, 1914, upon claims located prior to July 3, 1910, upon the relinquishment or surrender to the United States within six months from the date of this act by any locater or his successor in interest.

S. 875, by Senator Smith, of Arizona, provides that the mineral lands of the United States shall not be affected in any way or the manner of acquiring title be altered or modified by reason of such lands being included within any reservation created by executive order.

S. 869, by Senator Pittman. This bill provides for the establishment of a commission form of government in the administration of national affairs in Alaska. An administrative commission of five members is provided. The governor of Alaska is to be ex-officio chairman of the commission. The Surveyor General of Alaska is to be a member of the commission. The President, with the consent of the Senate, is to appoint the other three members. Two of the five members of the commission must have been residents of the territory for at least five years. Not more than three of the members shall belong to the same political party. The term of office for each member is four years. The President, however, has the right to remove any member. During his term of office each member shall reside in Alaska and shall not engage in any other business. The board is to hold its sessions and conduct its business, so far as is possible, in Juneau. All power and authority now vested in the commissioners of Indian affairs, the Bureau of Education, the Director of the Bureau of Mines, the General Land Office, Forest Service, Biological survey work, agricultural experiment stations, and fisheries service is to be transferred to the Alaska commission. The bill provides for the centralization in Alaska of practically all of the Governmental functions.

S. 1351, by Mr. Works. This bill provides for the discovery, development and protection of streams, springs and water holes in the desert and arid public lands of the United States in the State of California, and for rendering the same more accessible, and for the establishment of sign boards and monuments locating the same. This bill is identical with S. 487, of the Sixty-third Congress and was favorably reported by the Committee on Public Lands, December 17, 1915.

S. 2293, by Senator Shafroth, provides that all lands included in waterpower site withdrawals shall be subject to entry location and disposal under the public land laws applicable thereto with condition that any refusal of the owner thereof to obey the order of a State tribunal concerning the rates charged for electricity shall work a forfeiture to the United States of all claim or title to such lands.

S. 2844, by Senator Kern. This bill provides for the creation of a Bureau of Labor Safety in the Department of Labor. It provides for a Commissioner of Labor Safety who shall head the bureau, to be appointed by the President, and receive a salary of $5,000 per year. Its duty will be to make general and special investigation and examination of labor-safety plans and devices of all kinds, and the study of methods for the prevention of vocational diseases. A bill for the same purpose, H. R. 153, by Mr. Mann, has been introduced in the House of Representatives.

HOUSE BILLS

H. R. 18, by Mr. Taylor, of Colorado. This bill provides for a commission to codify and suggest amendments to the general mining laws. A full discussion of this bill, as well as that of Senator Smoot, appears in this issue in the account of the revision of mining laws meeting.

H. R. 96, by Mr. Cullop, makes unlawful the owning or leasing coal lands by common carriers except as may be necessary and intended for use in the conduct of its business. It also prohibits a common carrier to lease or sell, upon a royalty basis to any person, firm, or corporation, any lands underlain by coal, or any coal underlying any lands, whether the ownsrship of such lands and coal, has been, or may hereafter be, acquired by it. It provides that after January 1, 1916, it shall be unlawful for any common carrier to transport from any State, territory, or the District of Columbia, to any other State, territory or District of Columbia, or to any foreign country, any coal or products of coal, or products of land underlain by coal, manufactured, mined or produced by it, or under its authority, or by any firm, or corporation to whom the common carrier may have or hereafter may lease or sold upon a royalty basis any lands underlain by coal, except such coal or products as may be necessary and intended for its use in conducting its business as a common carrier.

H. R. 153, by Mr. Man. Providing for the creation of a Bureau of Labor Safety in the Department of Labor. See review of S. 2844, by Senator Kern.

H. R. 174, by Mr. Mondell, provides that all mineral locations on public lands after the enactment of the act shall reserve to the United Stats a preference right to purchase at a fair and reasonable price all radium bearing ores taken from such lands.

H. R. 175, by Mr. Mondell. This bill provides for the leasing of oil and gas lands, and for the exclusive right of the United States to take so much oil and gas produced therefrom as may be necessary for the use of the Army, Navy or Revenue Cutter service, paying therefor a reasonable and remunerative price. The bill fixes the royalty to be paid to the United States at one-tenth the value of the product at the well.

H. R. 232, by Mr. Wickersham. This bill provides for the establishment of a commission form of government in the administration of national affairs is Alaska, which shall consist of a commission of five members. This bill is substantially the same as S. 896 introduced in the Senate by Senator Pittman.

H. R. 242, by Mr. Stephens, of California, provides for the discovery, development, and protection of streams, springs, and water holes in the desert and arid public lands of the United States, for rendering the same more readily accessible, and for the establishment of and maintenance of signboards and monuments locating the same. (Same as S. 1351 by Mr. Works.)

H. R. 406, by Mr. Ferris. This bill provides for the exploration and disposition of coal, phosphate, oil, gas, potassium or sodium. Substantially the same as S. 777, by Mr. Walsh.

H. R. 408, by Mr. Ferris, provides for the development of water power and the use of public lands in relation thereto. The Secretary of the Interior is authorized by this bill to lease to any citizen, association or corporation, any part of the public lands of the United States, including Alaska, reserved or unreserved (excepting national parks or military reservations) for a period of not longer than fifty years, for the purpose of constructing, maintaining and operating dams, water conduits, reservoirs, power houses, transmission lines, etc. The Secretary is authorized to give preference to application for leases for the development of electrical power by States, counties or municipalities.

H. R. 518, by Mr. Bailey, authorizes the President of the United States to employ officers and men of Army and Navy in railway and other Government construction work, which includes the reclamation of arid lands, the darinage of submerged or swamp lands, the construction of levees, the laying out and building of highways, and the improvement of rivers and harbors. It also provides that civilians shall not be employed in any such work authoribed by Congress unless military and naval establishments can no longer supply officers and men necessary to carry on the work with reasonable expedition.

H. R. 671, by Mr. Auston. Provision is made in this bill for the application of a portion of the proceeds of the sales of public lands to the endowment of schools or departments of mines and mining. (Substantially the same as S. 50, by Mr. Smoot.)

H. R. 6043, by Mr. Raker. This bill is the same as introduced by Congressman Taylor, H. R. 18.

H. R. 6780, by Mr. Kahn. All public lands of the United States containing valuable deposits of asbestos are declared to be subject to location, and entry under placer mining laws by this bill, and locations heretofore made under placer mining laws of lands containing such deposits, may be perfected. If the lands heretofore located were located under laws applicable to lode-mining claims, they may be perfected under the provisions of such laws.

NEVADA'S 1915 METAL OUTPUT IS VALUED AT $34,566,000

The United States Geological Survey reports the value of the 1915 output of gold, silver, copper, lead, and zinc from Nevada mines as approximately $34,566,000. This represents an increase of nearly 18 per cent over the output of 1914, when metals valued at $29,300,842 were produced. These estimates, by V. C. Heikes, of the Salt Lake City office of the Survey, indicate a marked increase in zinc output, and increase in lead and copper yield, as compared with 1914. The copper production, however, was below that of 1913, when Nevada had a record output of over 90,000,000 pounds. There was a slight increase in the gold production, but a decrease in silver, largely in the Tonopah district, where the output was affected by the decreased price of silver.

The production of gold was valued at about $11,968,000, an increase of 4 per cent over the production of 1914. The greater part of the gold came from siliceous ores milled, and about 20 per cent of the total came from Tonopah. The Goldfield Consolidated treated over 386,000 tons of ore, but produced somewhat less gold than in 1914. Other mines in the district, however, went to make up this deficiency, for important tonnages came from the Jumbo Extension, which was shipping about 1,500 tons per month the early part of the year and subsequently nearly doubled this output. The Atlanta and Florence Goldfield also shipped considerable gold ore. Goldfield district produced approximately 40 per cent of the total gold of the State. The Nevada Wonder and Nevada Hills properties in Churchill County contributed, though less than in 1914. The output from Round Mountain, in Nye County, was also somewhat less, due to the installation of a pipe line for placer operations. There was a great increase, however, in the Seven Troughs district, where the Seven Troughs Coalition has added considerably to the gold production. The National mine, in Humboldt County, increased its output, but nothing was published concerning the property. Though the plant of the Aurora mine was closed part of the year for alterations to the mill, the bullion shipments were far in advance of those in 1914. The Pittsburgh Silver Peak Company, at Blair, Nev., was treating nearly 4,000 tons of ore per month, and the mines at Rochester produced shipping ore and bullion which contained some gold, though principally silver. The output of gold from the Tonopah district decreased from 128,137.32 ounces in 1914 to about 113,000 ounces in 1915, giving a production of over $2,335,000 in gold, though the district is primarily a silver camp. In Clark County, at the Quartette property, ore was treated at the Cyrus Noble mill as formerly, and a new cyanide plant was reported operating at the Colorado Nevada mine. In Elko County the Bluster mill, at Jarbridge, and the Rex mill, at Gold Circle, were active. There was much activity at the new camp of Willard, 9 miles northeast of Lovelock. Various lessees were shipping gold ore. In the Manhattan district of Nye County the Big Pine mine was the principal producer, the mill of which was treating 150 tons per day by amalgamation the latter part of the year. Four other mills were operated to smaller extent in the district—the Whitman & Kane, Manhattan Milling and Ore Company, the Associated Mill, and the War Eagle Mill.

SILVER PRODUCTION DECREASES

The silver production from Nevada mines decreased from 15,455,491 ounces in 1914 to about 14,478,000 ounces in 1915. The decrease was at Tonopah, where the mines were affected by the low price of silver. At the Comstock district of Storey County the production was also decreased, and the idleness of the Mason Valley copper smelter, to a small extent, lessened the silver output. The greatest silver producers in the State were the Tonopah Belmont, Tonopah Mining Company, Tonopah Extension, Jim Butler, and West End, at Tonopah; Nevada Wonder and Nevada Hills, in Churchill County, and the Rochester district, in Humboldt County. The mines in the last-named district were active, but particularly so after the advent of the Nevada Short Line Railroad. The 100-ton cyanide custom mill was operated, producing gold and silver bullion, and a small mill was active on the Lincoln Hill property. There was considerable activity in the Rand district of Mineral County, where unusually rich ore was shipped from the Last Hope, Gold Pen, Queen Regent, and Eagle properties. In the old camp of Belmont, in Nye County, a 200-ton mill, using flotation, was being constructed to treat dump ore containing silver.

The mine production of copper increased from 60,986,450 pounds in 1914 to about 67,480,000 pounds in 1915, an increase of 10.6 per cent. The total value of the output, on account of the high average price in 1915, increased from $8,111,198 to approximately $11,708,000. As the Mason Valley smelter was idle during the year, the greater part of the output came from White Pine County, where the Nevada Consolidated was particularly active toward the end of the year on account of the price of copper, which increased to nearly 20 cents a pound. During the first three quarters of the year 2,251,367 tons of ore were milled from this property and over 44,000,000 pounds of copper produced. The rate for the last

quarter was greatly increased. Ore from the Giroux was also milled and smelted at the Navada Consolidated plant. Copper ore was also shipped from the Goldfield district. Ore was shipped from the Nevada Douglas the latter part of the year and a 250-ton leaching plant completed for the treatment of low-grade ore.

GAIN IN LEAD YIELD

The lead production of Nevada mines increased from 12,809,655 pounds in 1914 to about 14,782,000 pounds in 1915, an increase of over 15 per cent. This output, however, is not as great as that of 1913, when over 16,000,000 pounds were produced. There was great activity in the Yellow Pine district of Clark County, where lead-zinc ore is separated into lead and zinc products. Several dry concentrating mills were added during the year. A large portion of the output came from Lincoln County, where the Prince Consolidated was reported shipping at the rate of 12,000 tons per month in October.

A great increase, nearly 62 per cent, was made in the mine output of zinc in Nevada, from 12,980,232 pounds of recoverable spelter in 1914 to over 21,000,000 pounds of the metal in 1915. As the price of the metal was abnormally high in 1915, the value of the output increased from $661,992 to about $2,993,000 in 1915. The Yellow Pine district of Clark County was by far the largest producer, but the Amalgamated Pioche property in Lincoln County made important shipments, and the Polar Star property and Arthur zinc mine, both in Elko County, contributed. Small shipments of zinc ore were also made from Ely in White Pine County and from Mineral in Eureka County. The latter part of the year the Yellow Pine mine had increased its shipments to the rate of 1,500 tons per month, the Potosi property to about 800 tons per month, and there was great activity in the other zinc properties in the district. The Green Monster was an important shipper at the close of the year.

The main dividend payers of the State were Nevada Consolidated, Goldfield Consolidated, Tonopah Mining, Tonopah Belmont, Tonopah Extension, Jumbo Extension, Jim Butler, Nevada Wonder, Seven Troughs Coalition, and West End. To December 1, 1915, the total in dividends was over $6,060,000.

NO METALLIC ARSENIC PRODUCED IN THIS COUNTRY

So far as the Geological Survey knows no one in the United States produces metallic arsenic. The whole United States production is in the form of the so-called white arsenic.

The only source of arsenopyrite from which the material could probably be shipped at once is that at Brinton, Va. It is known that the arsenic company at that place has had a considerable quantity of arsenopyrite mined ready to be worked for several years. C. R. Brinton, Brinton, Floyd County, Va., is interested in the deposit which is fourteen miles from the railroad at Christiansburg.

NITRATE WIDELY DISTRIBUTED BUT DEPOSITS ARE LEAN

Opportunity for Development on Commercial Scale Not Promising, Government Expert Says

Nitrate deposits in southern Idaho and eastern Oregon are discussed extensively in a report by G. R. Mansfield, of the Geological Survey. The report has just been printed and is now ready for distribution. Interesting extracts from this report are as follows:

"The nitrate deposits near Homedale, Idaho, appear to have been first discovered in the spring of 1914 by D. J. Sullivan, of Homedale, who, according to his own account, recognized their occurrence in the canyon of Jump Creek about 10 miles south of Homedale in proximity to an old metalliferous prospect just below the falls of that creek. Only a small quantity of the material was found, 'enough to fill two flour sacks,' but a strip of brown paper dipped in a solution of the substance and then dried and burned indicated by its sputtering scintillations the presence of a nitrate.

"About the same time the young sons of George D. Huntley, whose ranch lies in the canyon of Sucker Creek about 10 miles west of the Jump Creek locality, were playing in a small cave at the base of a cliff in the canyon about half a mile below their home. Having started a fire in the cave, they were surprised to find that some of the white material at the back of the cave and in the crevices of the rock took fire and burned vigorously. This incident, together with the discovery by a camping party of a white deposit at several localities on Sucker Creek, was reported to Mr. Sullivan, who visited the place and again recognized the presence of a nitrate in the deposits. Meanwhile a prospector named Lacky who had passed through Sucker Canyon had collected a sample of the white material and had shown it to persons in Ontario, Ore., among whom chanced to be Henry Wilson, a California mining engineer, who recognized the presence of a nitrate in the sample.

"Mr. Sullivan and his associates staked out claims, and shortly afterward interested persons from Ontario made extended examination of the district and rapidly staked out a large area, so that considerable local excitement ensued.

"The occurrences of the nitrates above mentioned are all associated with rhyolites. Nitrate deposits in rhyolites occur at several places in Nevada and Utah. The rhyolites seem to be widely distributed and to carry niter in many places, though niter is by no means confined to rhyolitic rocks. The Homedale district is therefore probably only a part of a much larger niter-bearing area, in which locally, as at Sucker Creek, the niter occurs in notable amounts.

"The little veinlets that contain the nitrate form only a small part of the whole mass in the zones where the nitrates occur—probably not

more than 1 per cent.—and the same veinlets carry other substances than nitrates, as is shown by the analyses. When the rock fragments are picked down from the cliff face at any of the prospects described, fresh veinlets are exposed, similar in character, number, and thickness to those previously found. How far into the rock this condition continues it is impossible to say from present data, as none of the prospects have penetrated more than 3 or 4 feet from the cliff face. The present evidence does not preclude the possibility of finding an increase in the size and number of the nitrate-bearing veinlets, or perhaps even large veins, when the rock is opened further. There seems, however, little likelihood of any marked increase in richness within the interior of the rock mass. On the contrary, it appears more probable that the richest parts of the deposit are those already exposed in the faces and along the bases of the cliffs and that the material will be found to grow gradually leaner and perhaps to disappear altogether as the rock is penetrated. Whatever may have been the mode of origin of the material, it probably owes its present position to the action of percolating waters on the one hand and to evaporation on the other. On that supposition the concentration of the deposit would naturally be greatest at or near the surface, where evaporation takes place. However, no positive statement can be made until more work has been done in opening the veinlet-bearing zones, both laterally and vertically."

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F. F. Sharpless, Secretary of the Mining and Metallurgical Society of America, was a caller at the office of the Mining Congress last month.

H. V. Winchell, of Minneapolis, Minn., was in Washington last month, attending the Mineral Land Law Revision meeting, and was a caller at the office of the Mining Congress.

John P. Reese, of Gillispe, Ill., spent several days in Washington last month.

Nat H. Wheeler, of Philadelphia, Pa., one of the representatives of the American Mining Congress to the meeting of the Mining and Metallurgical Society of America, held last month, spent several days in Washington.

Carl Scholz, President of the American Mining Congress, was in Washington several days last month.

C. M. Moderwell, of C. M. Moderwell & Co., Chicago, director of the American Mining Congress, was a Washington visitor last month.

Hugh Shirkie and J. C. Kolsem, of Terre Haute, Ind., spent several days in Washington last month, attending the meetings of mining men here at that time.

Walter Douglas, of Bisbee, Ariz., was a visitor at the office of the Mining Congress last month, and also attended the meeting of the Mining and Metallurgical Society for the Revision of Mineral Land Laws.

F. W. De Wolf, State Geologist, Urbana, Ill., was a caller at the office of the Mining Congress last month.

Dr. E. W. Parker, of Wilkes-Barre, Pa., spent several days in Washington last month attending the various meetings of mining men held at that time.

Dr. James E. Talmage, Salt Lake City, Utah, director of the American Mining Congress, is in Washington attending the Second Pan-American Scientific Congress, now in progress.

Hon. William A. Clark, Butte, Mont., was in Washington last month attending the Mineral Land Law Revision meeting.

Harold N. Lawrie, Portland, Oreg., was in Washington several days last month.

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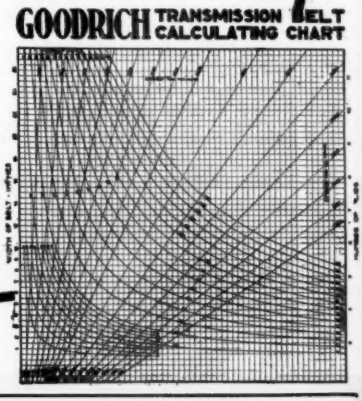

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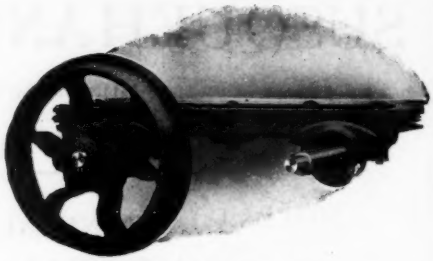

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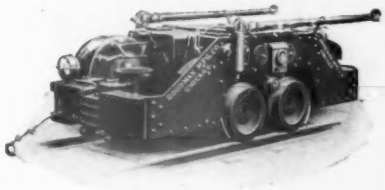

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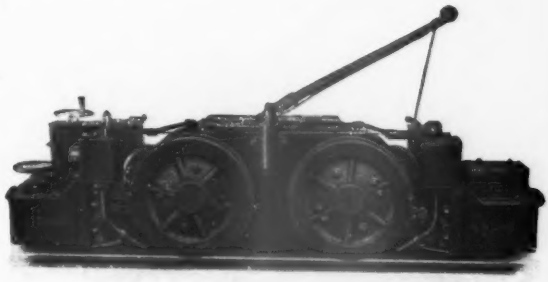

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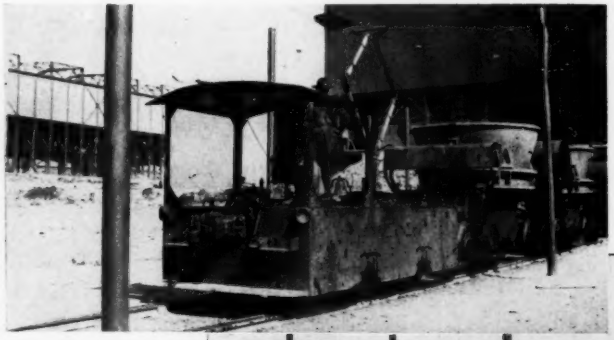
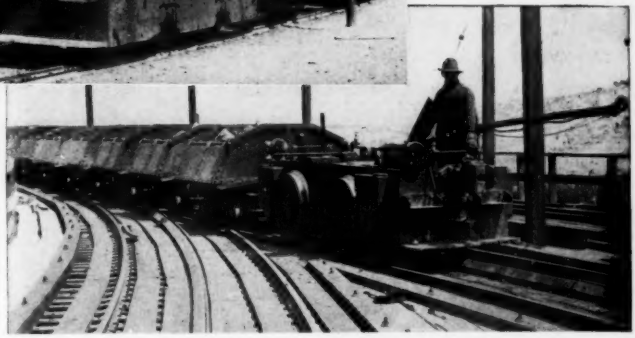
Jeffrey Electric Locomotives

Show Great Endurance in Smelter Service

At the United Verde Copper Co., Clarksdale, Arizona.



An 18-Ton Locomotive hauling Slag Pots from Furnaces to the Slag Dump. The Supreme Rest of the Load Pulling Powers of a Locomotive is found here.



A 10-Ton Electric Locomotive. The Third Rail System is used in order to get around the bins and through the yards, eliminating Trolley Wires.

The Locomotives for slag haulage are provided with special controllers for operating motors on the slag pots, which are thus controlled and dumped by the motorman. All the locomotives are provided with straight air brake systems.

Three 18-Ton, Eight 10-Ton, Nine 4-Ton, Four 6-Ton, Three 7-Ton Jeffrey Locomotives are used around the smelter and mines of this company.

The Acanonda Copper Co., Butte & Superior Copper Co., and the Bunker Hill & Sullivan Mining Co. are some of the other prominent companies who are extensive users of Jeffrey Locomotives.

Write for Catalogs and full information about Jeffrey Locomotives, Elevating, Conveying, Screening, Crushing and Power Transmission Machinery, Coal Tipple Machinery, Coal Cutters, etc.

THE JEFFREY MFG. CO., 959 North Fourth St., COLUMBUS, O.

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